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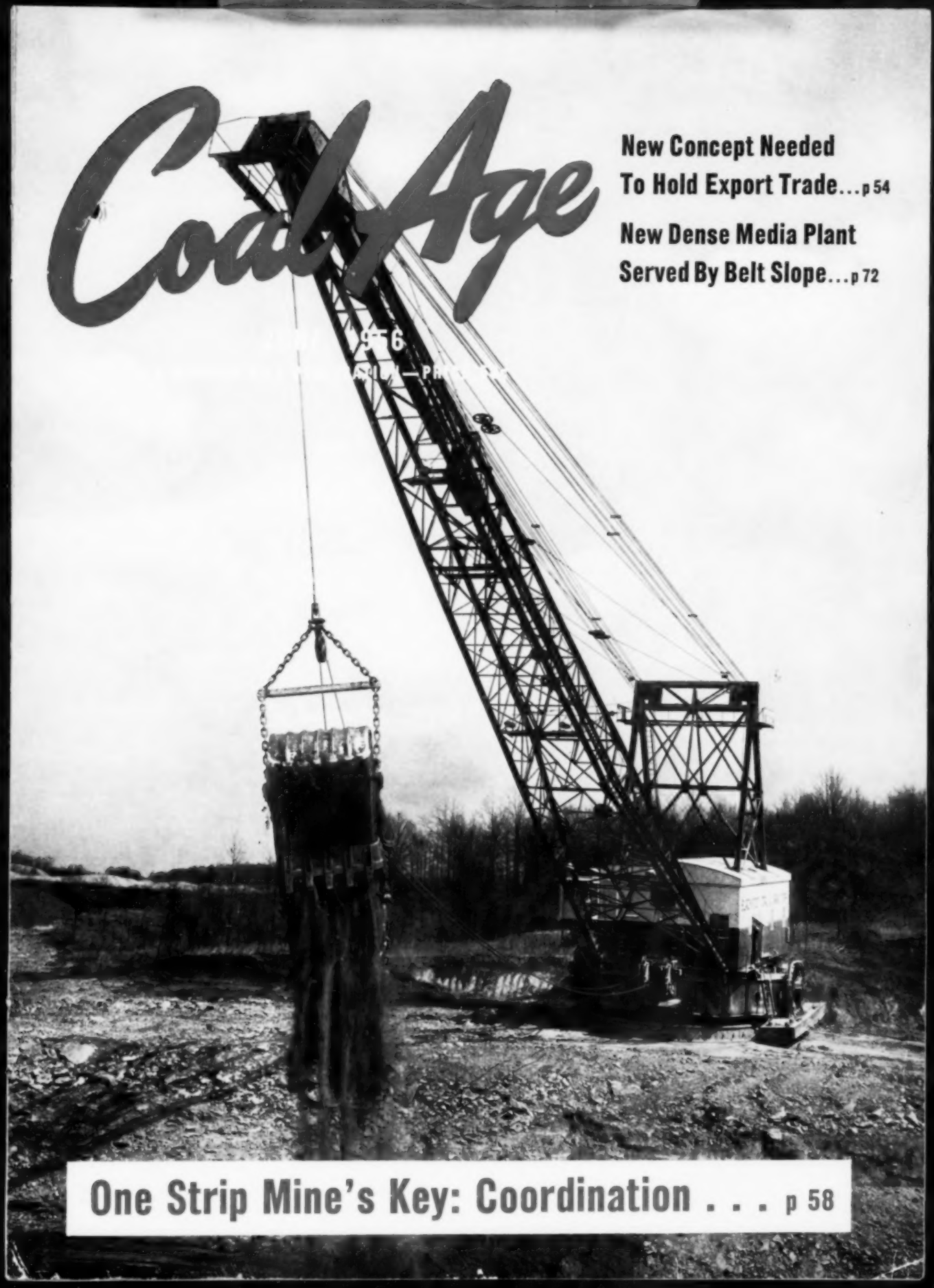
To Hold Export Trade... p 54

New Dense Media Plant
Served By Belt Slope... p 72



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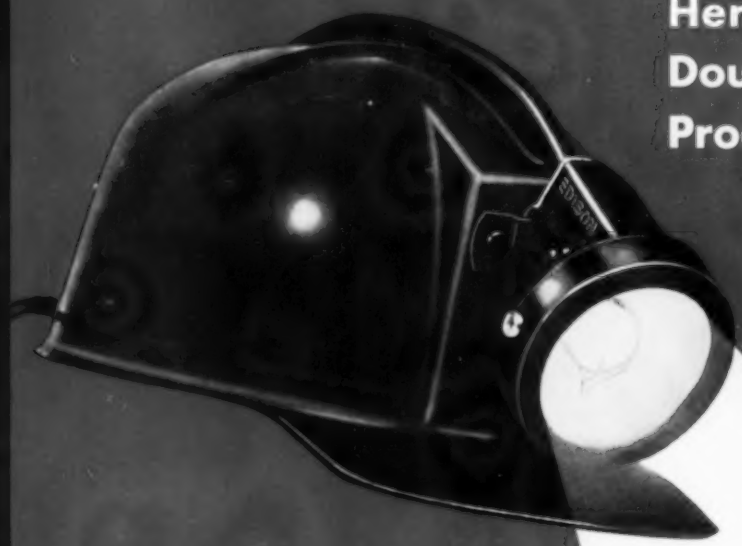
Here's why the Edison R-4 Double Filament Bulb saves Productive Man-hours— promotes greater underground safety



With the Edison R-4 double filament bulb, a burned-out filament doesn't mean lost time for the miner or a short crew for the foreman. A turn of the switch transfers the power of the unfailing Edison battery to the second filament—restores *continued, brilliant illumination.* There is only one bulb, located in the center of the headpiece, which gives the advantage of maximum reflector area.

This reserve protection saves hundreds of man-hours every year, adds an extra margin of safety. Write for full details.

BURN-OUT doesn't mean BLACKOUT

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B.F.Goodrich

Stonega Coke and Coal Company's Crossbrook No. 1 Mine

B. F. Goodrich belt resists fire, will not spread flames

THREE years ago, this Virginia coal company took a major step toward increased mine safety. They ordered B. F. Goodrich conveyor belts, made with a new fire-resisting rubber.

The B. F. Goodrich fire-resisting belt will not support combustion or spread fire. While it will smolder when exposed to open flame, it stops immediately when the fire is removed. B. F. Goodrich belts have been accepted for listing as fire resistant by The Bureau of Mines (Acceptance No. 28-6).

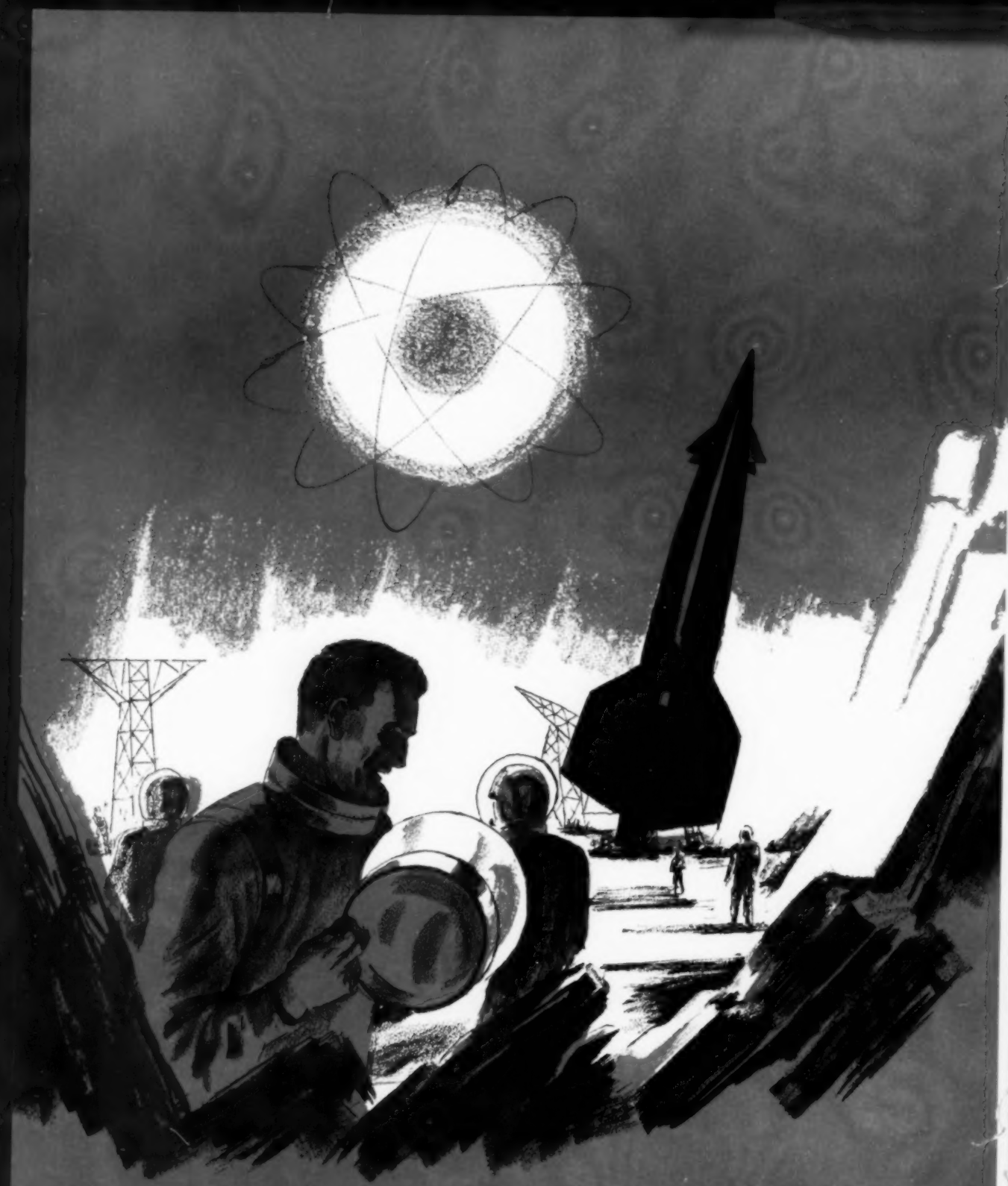
The special rubber used in these belts also has high resistance to impact, abrasion, oil, grease, tearing, cutting, gouging, and even mildew attack. As a result, B. F. Goodrich belts made with fire-resisting rubber can be expected to equal—or surpass—the long service records made by other B. F. Goodrich Caricoal belts in underground mines.

At the mine shown in the picture, the superintendent reported that the B. F. Goodrich fire-resisting belts show little or no wear.

Let your B. F. Goodrich distributor show you how longer-lasting Caricoal conveyor belts can cut your coal-handling costs, reduce maintenance costs, and if made with fire-resisting rubber, reduce the chance of fire in your underground mines. *The B. F. Goodrich Company, Dept. M-646, Akron 18, Ohio.*

B.F.Goodrich

INDUSTRIAL PRODUCTS DIVISION



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IF YOU BUY ON THE BASIS OF COST-PER-TON... THIS IS YOUR LUBRICANT!

HULBURT OIL & GREASE COMPANY

PHILADELPHIA PA.

For 40 Years Specialists in Coal Mine Lubrication

IN LUBRICATION

No matter how you wash your coal

the best way to dry the fine coal is with

ONE of these TWO BIRDS

Solid bowl or *screen* centrifugal — the right centrifugal for *your* preparation plant depends on your washing equipment and procedures. Here's a quick run-down on each BIRD.

The Bird Continuous Centrifugal *Solid Bowl* Coal Filter

- Handles feed at any flowable consistency — table discharge makes an ideal feed.
- The only equipment that does *the* complete job. No supplemental or auxiliary equipment required.
- Big capacity — built in three sizes, the largest to deliver up to a ton or more of ⅜" by 0 coal per minute.
- High recovery of coal values.
- Controlled rejection of high ash fines when desired.
- Moisture content of delivered coal as low as can be obtained mechanically.
- Lowest over-all cost.

The Bird-Humboldt Continuous Centrifugal *Screen Type* Coal Dryer

- Continuous operation for months with only routine maintenance.
- Long screen life — in excess of 500 hours, based on actual field experience.
- Exceptionally low power requirements — approximately 0.4 HP per ton.
- Big capacity, 70–80 tons per hour.
- 98% or higher recovery of feed solids.
- Low moisture content — minimum obtainable mechanically.
- Practically no degradation.
- Handles feed from dewatering screens containing as much as 45% water.

BIRD MACHINE COMPANY

SOUTH WALPOLE • MASSACHUSETTS

REGIONAL OFFICES: EVANSTON, ILLINOIS • PORTLAND, OREGON

Coal Age

JUNE • 1956

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In this issue . . .

• On p 54 *Coal Age* brings you a follow-up story on our March export feature, "U. S. Coal Props World Prosperity." In this newest probe of exports our editors found that overseas customer resistance shows signs of stiffening as buyers begin to wait and see whether they can get a better delivered price later on. If the mood should snowball, the result could be a depressed market here as 35 to 40 million tons turn up with no place to go.

• A new 250-tph dense-media plant, centrally situated near a belt slope tapping the center of future mining areas, is another milestone in the development of Seanor Mining Co.'s 2,000-tpd mine. Coal moves from the section to the plant over more than 2 mi of 30-in belt conveyors. p 72

On our cover

One of the ingredients that go into a particular, well-coordinated strip operation is this walking dragline with its 165-ft boom and 14-cu yd bucket. It works around the clock uncovering No. 4 coal and moves 350,000 yd of material in a 30-day month. With its help, its owner, the Blackfoot Coal & Land Corp. keeps activities running smoothly in two separate pits of an Indiana mine. "Exercise in Coordination," the story of Blackfoot's operation, begins on p 60 and will tell you how the company utilizes rail and truck haulage, strips with both shovel and dragline, washes coal and drys it thermally.

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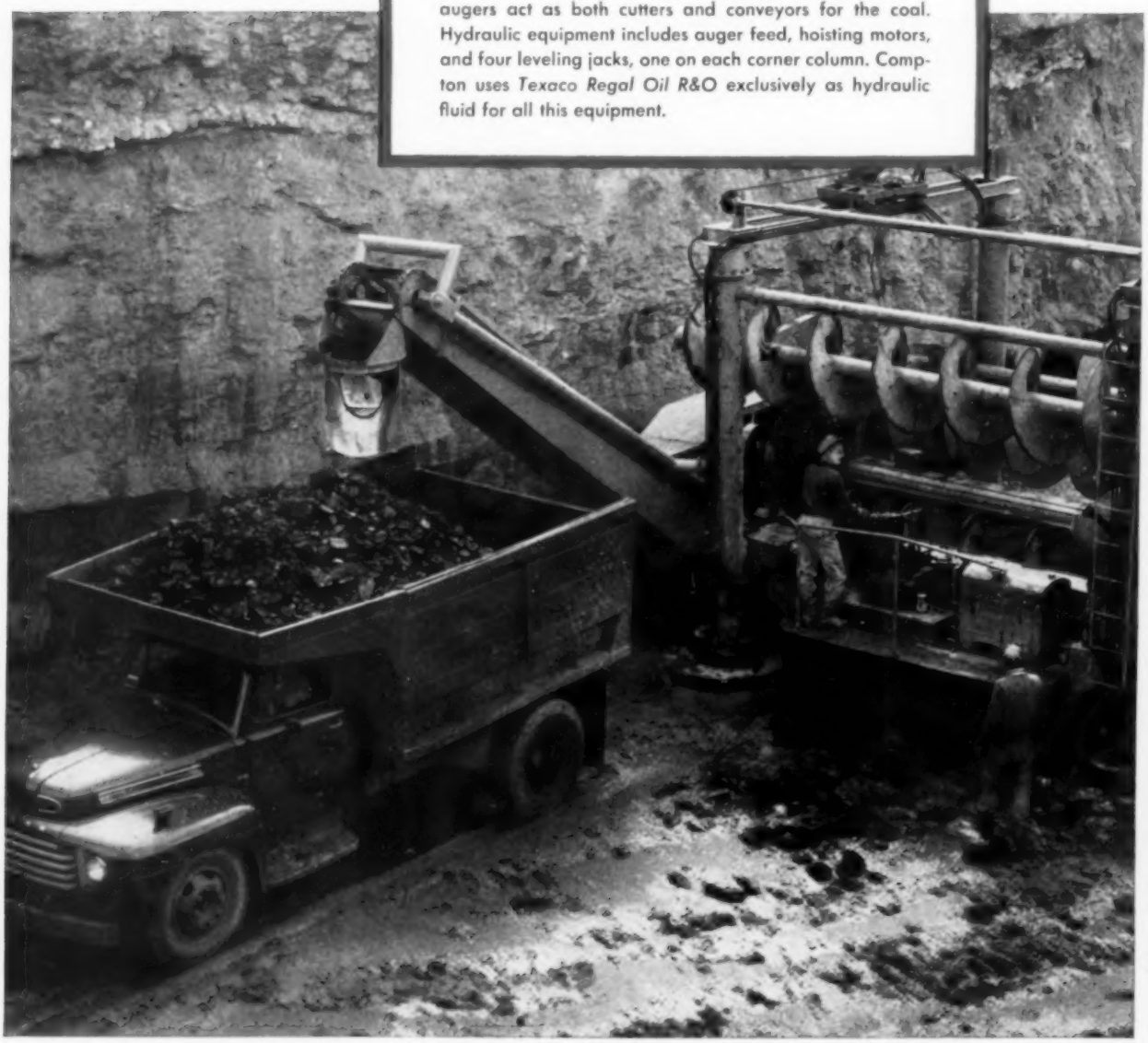

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a unique hydraulic operation

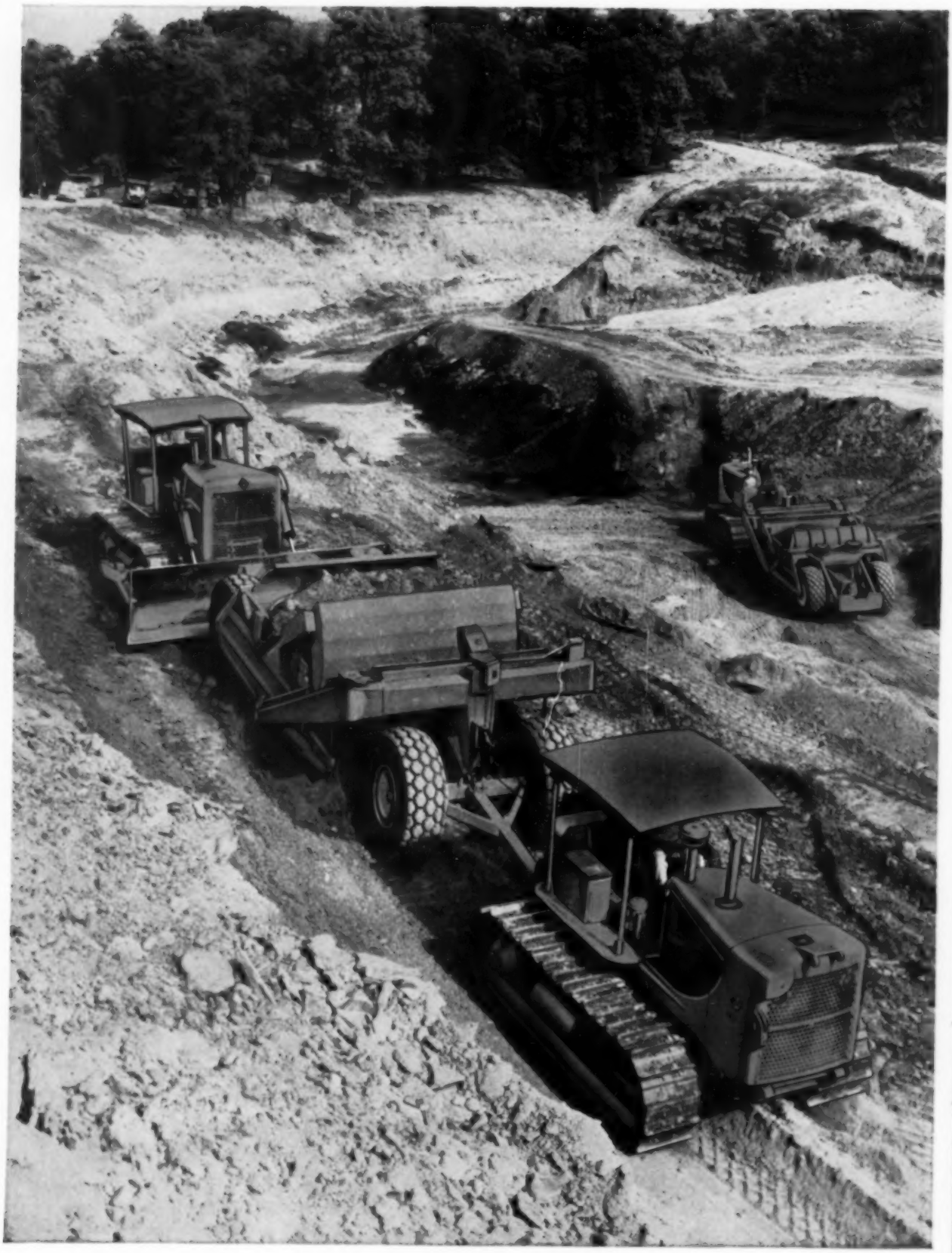
Compton, Inc., Clarksburg, West Virginia, began manufacturing its revolutionary coal auger five years ago. Since efficient hydraulic performance is vital to the machine's successful operation, various oils were tested under rugged service conditions. *Texaco Regal Oil R&O* came through these tests the winner on every count. That's why a factory fill of *Texaco Regal Oil R&O* goes into the hydraulic reservoir of every Compton Coal Auger—why all units bear a plate recommending the continued use of this great oil.

Manufacturers and operators everywhere rely on *Texaco Regal Oil R&O* for clean, dependable hydraulic operation. Tests prove *Texaco Regal Oil R&O* has more than *ten times the oxidation resistance* of ordinary turbine-quality oils. It prevents sludge, rust and foam from forming in hydraulic systems—prolongs the life of all parts and keeps maintenance costs down.

Wherever hydraulic equipment is used, whatever the type of mechanism or the operating conditions—there is a complete line of *Texaco Regal Oils R&O* to meet every demand. Let a Texaco Lubrication Engineer help you select the proper ones. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write:

The Texas Company, 135 East 42nd Street, New York 17, N. Y.

LUBRICANTS for the Coal Mining Industry



This Allis-Chalmers HD-21 is general handy man at the Furr Coal Company's mine. It builds and maintains incline ramps between cut and fill areas to provide short haul cycles. With rear-mounted ripper, it loosens overburden when necessary to insure continued, fast loading. It also acts as a stand-by pusher.

Two Allis-Chalmers HD-21 tractors and pull-type scrapers strip overburden, carry it down an incline and spread it in a worked-out section of the mine and return empty up another ramp. By this method, the Furr Coal Company reclaims land without rehandling material. Savings amount to 8¢ a ton or roughly $1.50 for every scraper load.

Furr Coal Company Strips Overburden, Reclaims Land in One Operation

saves 8¢ on every ton of material moved

The mobility of Allis-Chalmers tractors and pull-type scrapers enables the Furr Coal Company, Nelsonville, Ohio, to handle stripping and land reclamation in one operation. As scrapers remove overburden from new deposits, they haul and spread it in a worked-out section of the mine. This eliminates a second handling and saves an estimated cost of 8¢ a ton for land reclamation.

On this operation, overburden consists of earth and clay with very little rock. The big HD-21's have the power to load the 18-yd scrapers—usually without a pusher—and the speed to complete the cycle quickly.

"I've owned other makes of tractors and scrapers," says Mr. Furr, "and I have these because I believe them to be the best." Mr. Furr likes the Allis-Chalmers diesel engine, the construction of the tractor and the fact that it has proven torque converter drive. He also estimates that its thousand-hour lubricating intervals save about 30 minutes' servicing time every shift . . . "and this really adds up to important savings."

Find out how Allis-Chalmers equipment can bring new efficiency to your stripping and reclamation work. See your Allis-Chalmers Construction Machinery dealer.

ALLIS-CHALMERS, CONSTRUCTION MACHINERY DIVISION, MILWAUKEE 1, WISCONSIN

ALLIS-CHALMERS

ENGINEERING REPORTS:

Powered by General Electric system . . .

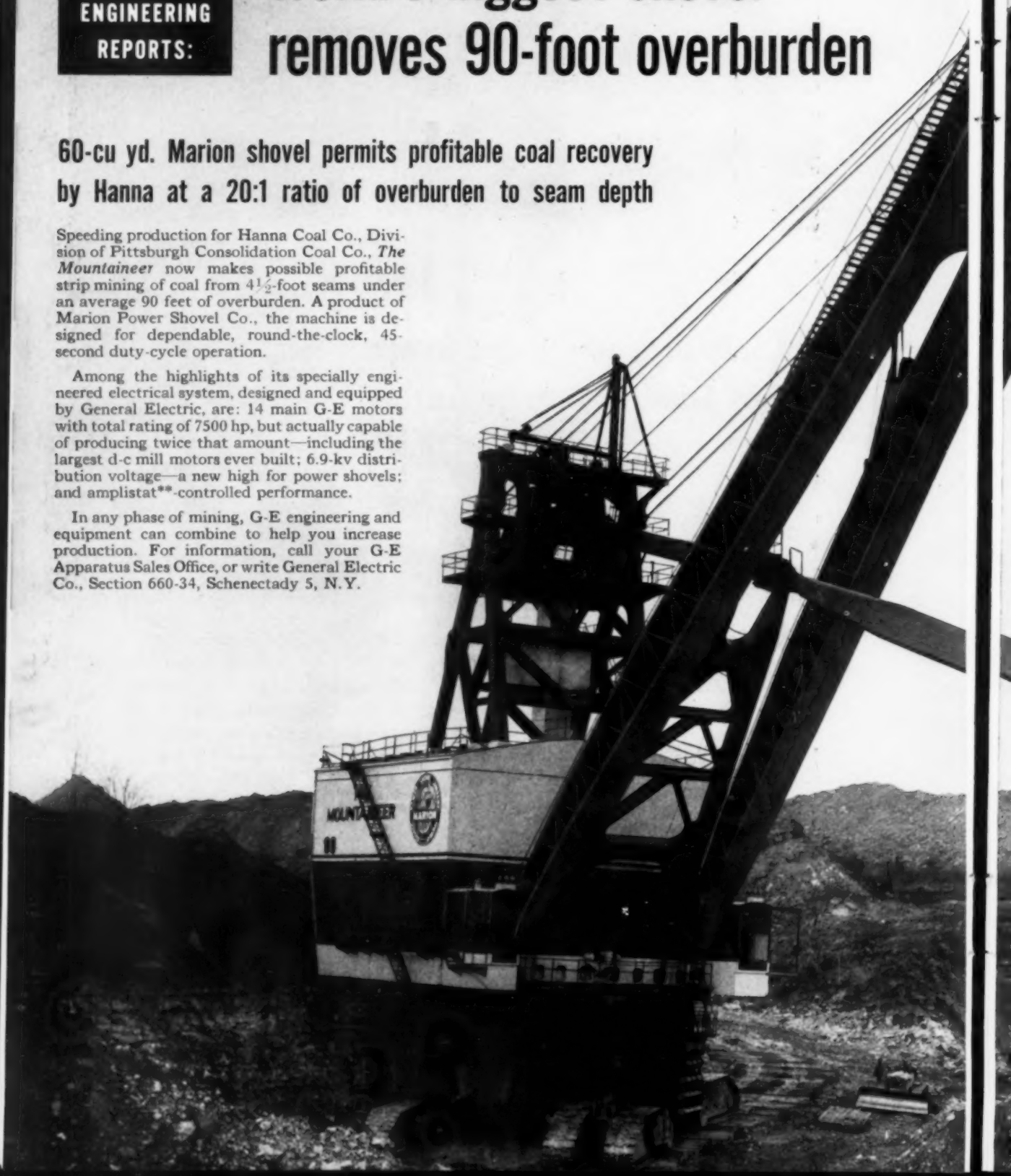
World's biggest shovel removes 90-foot overburden

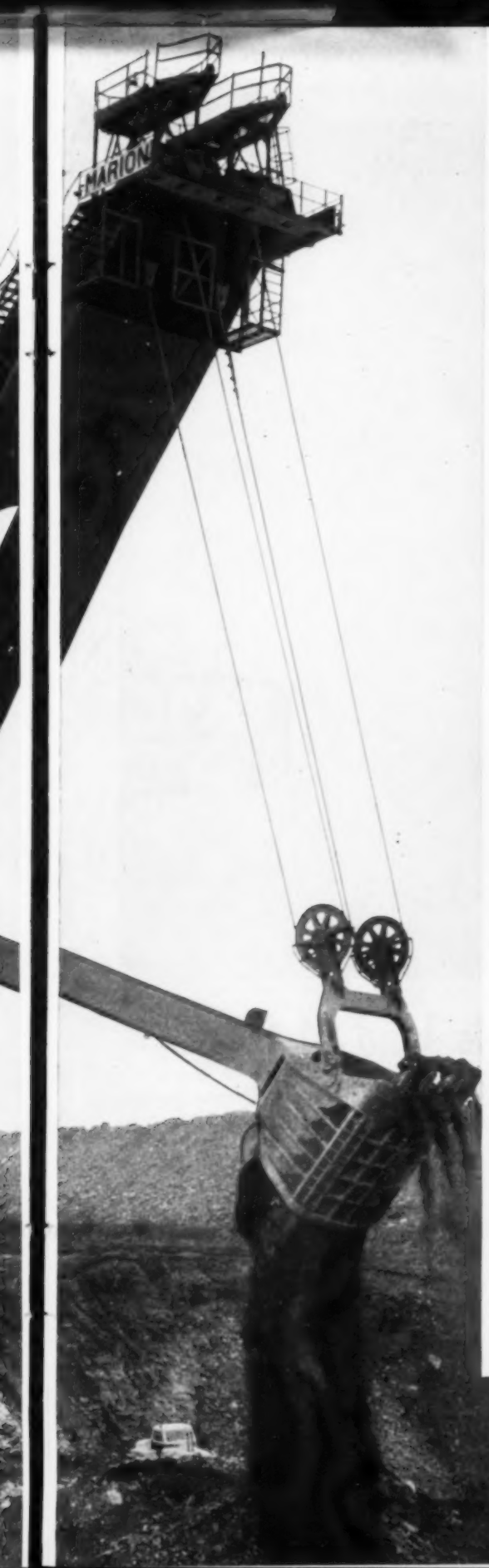
60-cu yd. Marion shovel permits profitable coal recovery by Hanna at a 20:1 ratio of overburden to seam depth

Speeding production for Hanna Coal Co., Division of Pittsburgh Consolidation Coal Co., *The Mountaineer* now makes possible profitable strip mining of coal from 41½-foot seams under an average 90 feet of overburden. A product of Marion Power Shovel Co., the machine is designed for dependable, round-the-clock, 45-second duty-cycle operation.

Among the highlights of its specially engineered electrical system, designed and equipped by General Electric, are: 14 main G-E motors with total rating of 7500 hp, but actually capable of producing twice that amount—including the largest d-c mill motors ever built; 6.9-kv distribution voltage—a new high for power shovels; and amplistat**-controlled performance.

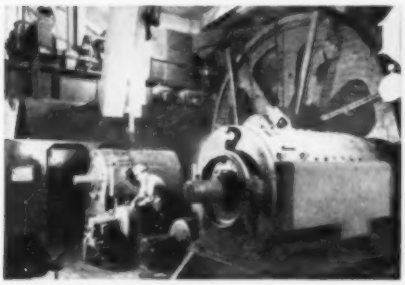
In any phase of mining, G-E engineering and equipment can combine to help you increase production. For information, call your G-E Apparatus Sales Office, or write General Electric Co., Section 660-34, Schenectady 5, N.Y.





G-E ANALOG COMPUTER enabled engineers of Hanna, Marion, and G.E. to complete in two weeks calculations on design and performance that might have taken three years.

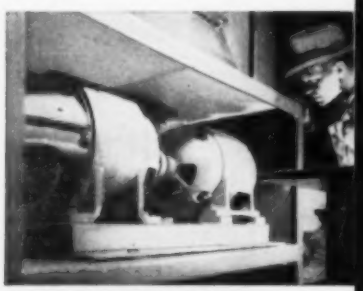
4 RUGGED G-E vertical armored d-c motors, developing 1900 hp, give top performance on high-capacity, heavy-duty swing-motion.



HIGH DEPENDABILITY on a demanding application is provided by four G-E d-c mill motors developing 5000 hp for hoist-motion, equipped with Tri-Clad '55'† blower motors.

SHOCK-RESISTANT G-E armored motors, atop frame, power crowd-motion. Sturdy design helps assure long life on rugged duty.

ABUNDANT DC POWER for operating needs is supplied by two large G-E motor-generator sets. Synchronous motors drive seven generators, which develop 6000-kw peak output.



FINGER-TIP CONTROL of operating functions is provided by adjustable-voltage system with responsive G-E Amplidynes*.

SPEED CONTROL with protection from heavy impact loads during repeated bucket loading, plus simple one-man operation is provided by reliable G-E amplistat control panel.

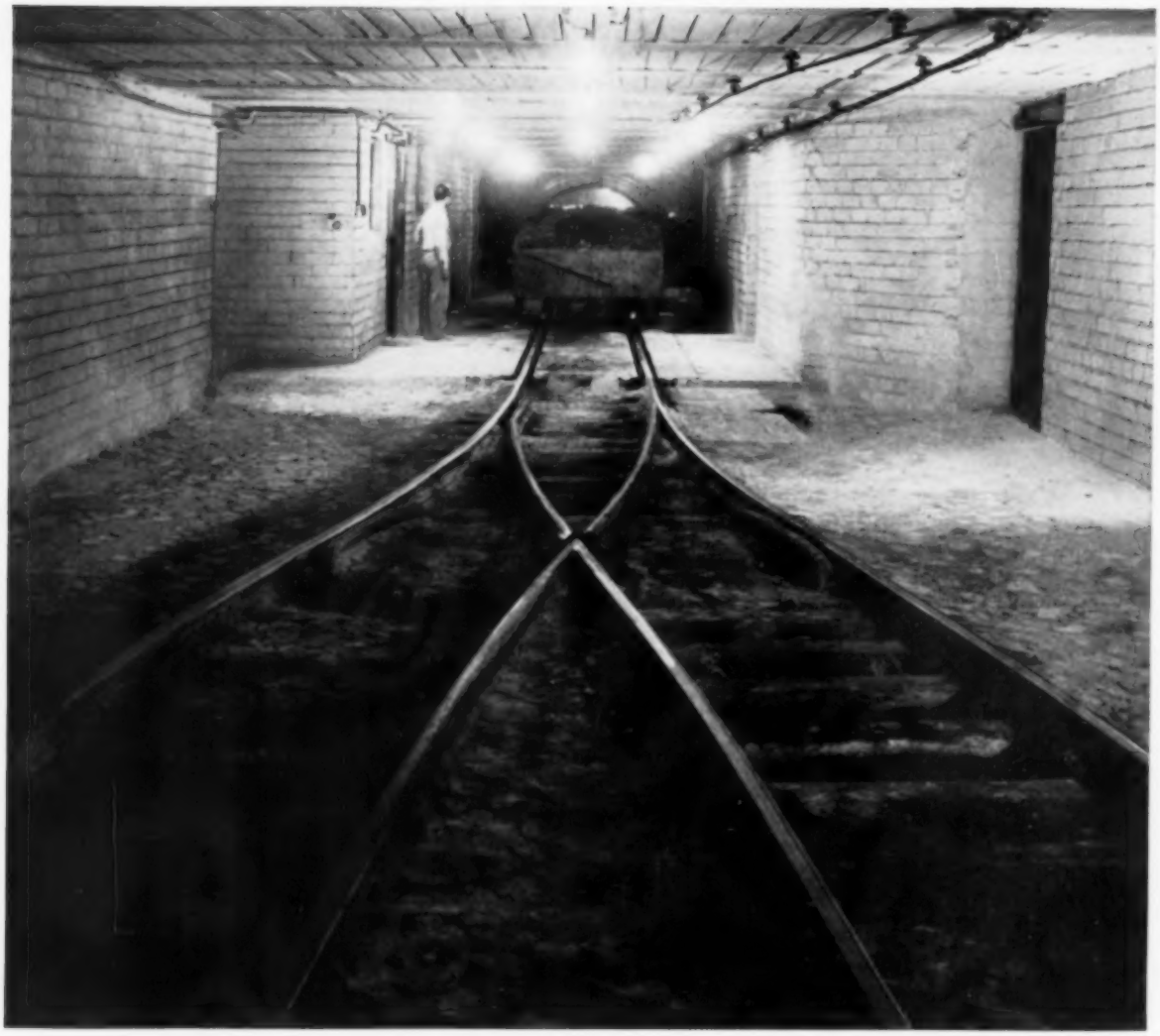
*The Amplidyne—rotating amplifier developed by General Electric.
**Amplistat—static amplifier developed by General Electric Co.

PROPELLING SHOVEL, four 250-hp G-E wound-rotor motors, powering 8 crawlers, are controlled at second operator station.

†Reg. trade-mark of General Electric Company.

Engineered Electrical Systems for the Mining Industry

GENERAL ELECTRIC



Traffic keeps moving on this kind of track

The owners of this progressive Pennsylvania mine know full well the importance of smooth, efficient haulage in the overall mining picture. For that reason they planned their trackwork with the aid of Bethlehem engineers widely experienced in mine-track design and fabrication.

This diamond turnout is a good example of the kind of results they got (and you can get, too) by handing Bethlehem the job. Notice how smoothly those curves flow, how accurately the frog lines up, how heavy the rail is and how rugged and substantial the whole assembly looks. Traffic can keep moving surely and steadily on trackwork like this!

Bethlehem track specialists welcome a challenge of this kind, and they are well-equipped to meet it. They study the situation thoroughly, draw up plans for approval, then turn in the design for fabrication. Before the finished track ever sees a mine, it will have been completely pre-assembled on our layout floors to be sure of perfect fitting.

Best of all, though Bethlehem trackwork is superb, its long-range cost comes to a pittance through the operating economies it allows. A Bethlehem mine-track engineer will be glad to discuss details with you, any time you say. You can reach him through the Bethlehem district sales office nearest you.

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21432 Patented and Patents Pending

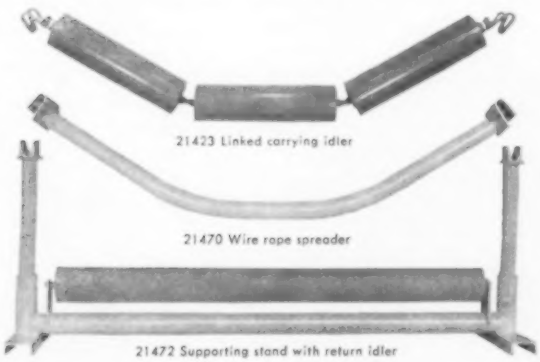
You win all-ways with the new GOODMAN *Rope Belt** CONVEYOR

Easier Handling:

By eliminating practically everything but the belt itself and the terminal sections, hours have been chopped off installation and extension time. For example, the Rope Belt can be extended 150 feet in less than one hour between shifts, with no loss in production time. All necessary parts can be hauled in one mine car or shuttle car with room to spare.

Improved Haulage Capacity:

Hinged action of the linked idlers and spring action of the parallel ropes "cup" the belt to the load, provide shock-free travel without shifting and without spillage. One mine superintendent reports 4500 tons per shift on a 500 foot 42" Rope Belt running at 600 fpm. And this is not at all unusual.



No tools are needed to add these parts to conveyor line. There is no framing that requires positioning for hooking or bolting together.

Lower Maintenance Costs:

Shock-free operation means less wear and tear on belt and idlers . . . fewer repairs . . infrequent replacement An added bonus from the standpoint of wear and attention required is the constant alignment of ropes between anchor points and the belt aligning influence exerted by each linked idler assembly.

These time saving, money saving facts are based on actual operating experience. They show why a Goodman Rope Belt Conveyor quickly pays for itself in light or heavy duty service. Want more details? Write us today.

*Trade Mark

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MANUFACTURING COMPANY
Halsted Street and 48th Place, Chicago 9, Illinois

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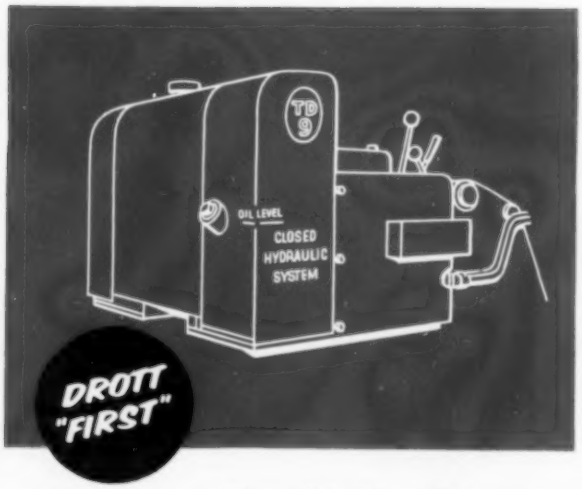
SHUTTLE CARS • LOCOMOTIVES • CONTINUOUS MINERS

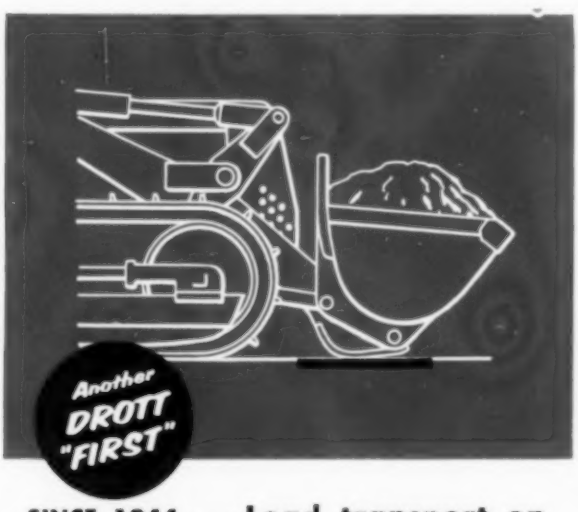
Use Genuine Goodman Replacement Parts

HOW YEARS-AHEAD INTERNATIONAL® DROTT® "FIRSTS" give you world-beating performance!

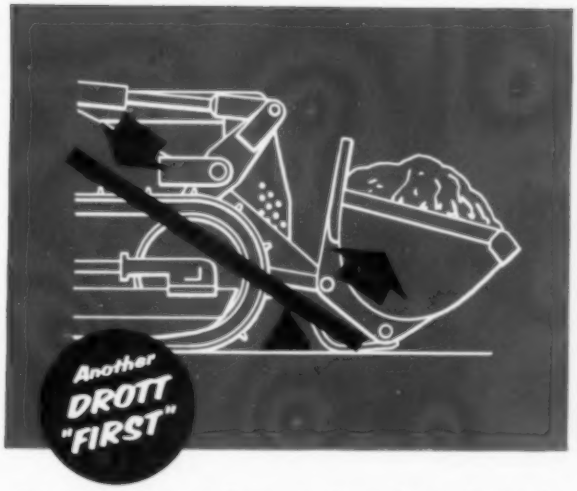
Major design features behind world-beating International Drott machine performance are not "flash" inspirations—not hastily-contrived imitations—not spur-of-the-moment attempts to "catch-up." Instead basic Drott features are "originals"—with years of patient and productive *field* and *engineering* experience in their conception and development. *By owning Drott equipment, you get the big profit-advantages of years-ahead design and performance—right now!* Look at the record! Compare the results!



SINCE 1937... Closed hydraulic system Excludes abrasives and other foreign material—reduces wear and simplifies servicing. Keeps oil in; keeps air and dirt out.



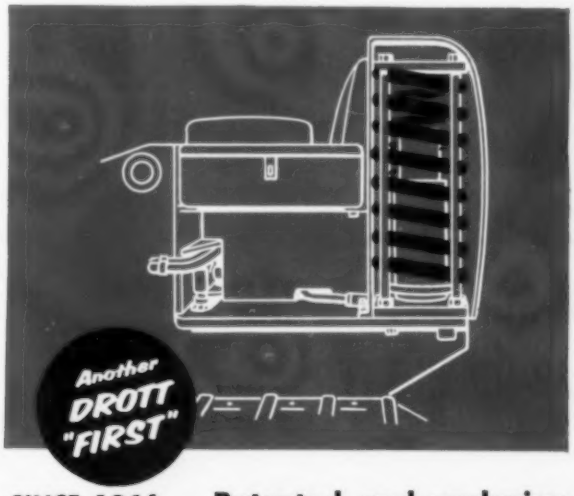
SINCE 1944 ... Load transport on patented, exclusive, frame-mounted skid-shoes Prevents tractor "teeter-totter"; saves carry strain by "semi-skidding" heaped loads. Increases yardage.



SINCE 1944 . . . Pry-action break-out Employs simple lever principle to give you *exclusive* triple-power digging force, ranging from 12,800 to 55,000 pounds! Shunts stresses into ground, so they can't maul bucket or tractor.

SINCE 1944 . . . Ground-level bucket roll-back Obtains heaped loads; *keeps the heap* to deliver extra yardage.

SINCE 1944 . . . Parallelogram raise action Keeps bucket at its 42° non-spill, roll-back level, all the way up. Increases yardage—avoids "spill-back."



SINCE 1946 . . . Patented and exclusive shock-swallowing hydro-spring Reduces effects of impact forces by 67%—to prolong equipment life, cut upkeep, reduce downtime, add operating comfort!

SINCE 1954 . . . Patented and exclusive DROTT Four-In-One Skid-Loader, bulldozer, Bullclam, clamshell, all in one—4-machine utility, one moderate investment. Now in 3 sizes, 1 yard to 2¼ yard capacity.

International Drott "firsts" like these combine to give you money-making performance and value *not available elsewhere*. You can prove it to your *satisfaction* and *profit*, by demonstration. See your nearby International Drott Distributor!

International Harvester Company, Chicago 1, Illinois
Drott Manufacturing Corp., Milwaukee 8, Wis.

INTERNATIONAL HARVESTER

INTERNATIONAL®
DROTT®

JOY
20-BU LOADER
8-SC SHUTTLE CAR
12-RB CUTTER

"12-20-8" COMBINATION

AVERAGES 950 TONS A DAY (2 SHIFTS)

HERE'S the typical operating performance of a Joy low-vein equipment team, recorded during a recent three-month period.

Two 12-RB rubber-tired cutters, two 20-BU loaders and four 8-SC shuttle cars, operating in a West Virginia mine on a "two-working, one-off" shift basis, are producing an average of 950 tons of coal every day . . . and have reached peaks of 1200 tons per day.

The mine is operating in the Peerless Seam, in coal that varies in height from 35″ to 37″. A channel sample shows analysis of 3% ash, 1% sulphur. The bottom is fire-clay, and the top is normally very hard slate, but there is a draw slate varying from 1″ to 3″ in thickness that comes with the coal. This draw slate is not picked before the loading operation underground, but is removed by a man at the outside and near the belt head piece. Main haulage consists of two Joy MTB-30 belt conveyors, 1000 and 2600 feet long respectively.

The total number of men on the payroll is 55 on three shifts, with the third shift consisting of five men on equipment-greasing and supply duties. Production per man-day therefore varied from 17.3 tons average to 21.8 tons at the peak—a highly favorable rate in 36″ coal.

In every coal-producing area and under all seam conditions, Joy mining equipment is setting the records for low-cost, high-production operation. Let us work with you. ***Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.*** In Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*

12-RB CUTTER

A rubber tire-mounted, mobile cutting machine only 26″ high, supplied either as a bottom cutter or top cutter. Hydraulic tramming, steering and controls, with hydraulic pump driven by a separate motor. Ample capacity to keep out in front of the loader.

20-BU LOADER

Over-all height is only 24″, yet maximum capacity is 8 tons per minute. Employs the exclusive Joy loading principle. Gathering arms and conveyor are independently driven. Has swinging tail conveyor, individual crawler-tread drive, and exclusive Magnetax control.

8-SC SHUTTLE CAR

Rubber tire-mounted, highly flexible and maneuverable. Only 26″ in height, with a level capacity of 2 tons, the 8-SC has four-wheel positive drive, four-wheel hydraulic steering, and four-wheel Joy single-disc brakes—also hydraulically-driven cable reel and hydraulically-adjustable elevating discharge.

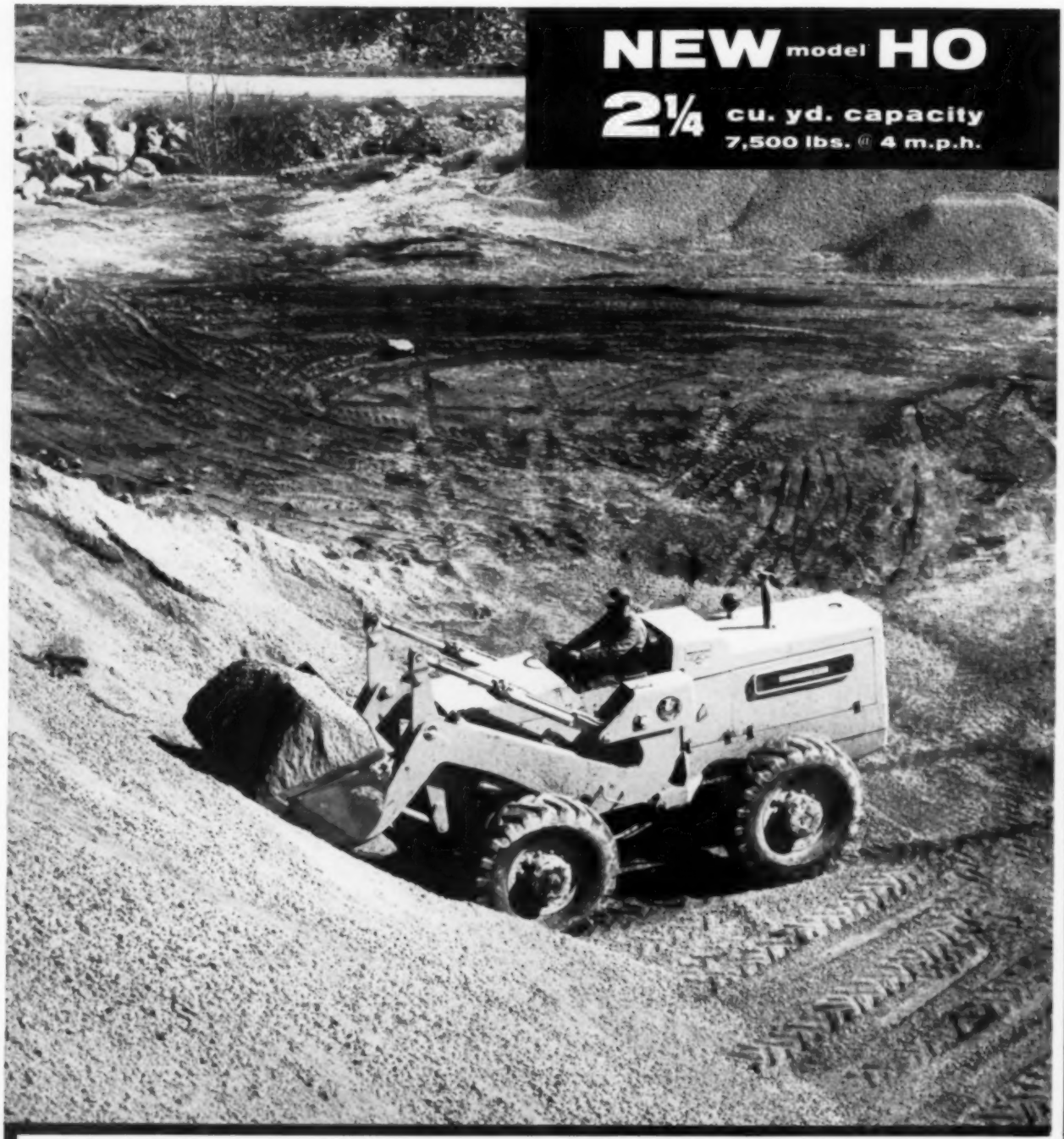
Write for FREE Bulletin 105-1

Consult a Joy Engineer

JOY

WORLD'S LARGEST MANUFACTURER OF UNDERGROUND MINING EQUIPMENT

WSW CL 5449-105



Gets MORE Keeps MORE Delivers MORE

More Productive Capacity

It's the yardage a tractor-shovel delivers per hour or per shift that counts, and that is why the big new model HO "PAYLOADER" is outstanding. Pound for pound it's way ahead of the field in digging power, in maneuvering speed, in carrying capacity. It *gets more* load because of the pry-out and 40 degree tip-back bucket action — it *keeps more* (less spillage) while carrying because of the shock-absorber cushioning of the bucket — and it *delivers more.*

It operates easier, rides smoother — with or without a load — than anything near its size. It has balanced design and durability *throughout* to work for you day after day without interruption. If you want big *productive* capacity you want this big model HO.

HOUGH Design . . . Quality . . . Value

Digging power: Pound for pound, this "PAYLOADER" has more traction and digging power — for a wider range of ground conditions — than any wheeled tractor-shovel ever built.

Less slippage: New, exclusive feature — torque-proportioning differentials — reduce slipping, give better traction. Up to 24% more torque is automatically transferred to the wheel with best traction.

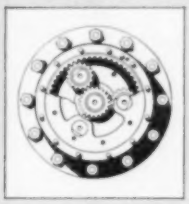
Hydraulic shock absorber: A shock absorber in the hydraulic system smooths out the ride, permits faster load-carrying speeds over rough terrain — with less spillage.

More production, less effort: Power-steer, power brakes (on all 4 wheels), power shift (no "clutching") and good riding qualities also lessen operator fatigue — promote full production all day.

Stay-clean hydraulic system: The hydraulic system is closed and pressure-controlled to keep air and dirt out — reduces oil foaming, lessens trouble and prolongs life of all hydraulic system parts.

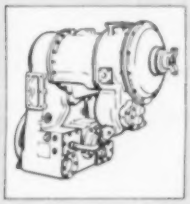
Long-life, high-traction drive train

Torque-proportioning differentials, an exclusive feature, assure effective traction under slipping conditions. If one wheel starts to slip, more power is delivered to the opposite wheel. Rugged planetary final drives in the wheel hubs, plus hypoid differential gearing, keep torque low in axles . . . prolong life of axles and all drive train parts.



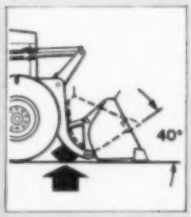
Complete Power-shift Transmission

The fastest and easiest-operating transmission you've ever seen. All shifts can be made instantly on-the-go, under full engine speed. There's no stopping for a RANGE shift, there's no foot clutch. With the forward-reverse control, the operator can "creep" the machine at full engine speed, in any gear, while maintaining full bucket action . . . all this, plus torque converter drive.



Tremendous pry-out action and 40° tip-back at ground level

Special pads are provided on the bottom of the boom arms to give ground support for powerful pry-out action. Load forces are also absorbed by the pads, relieving the axles and wheels of these strains. The bucket can tip back 40 degrees, before raising, to get heaped loads even in shallow cuts and low piles and to retain heaped loads.



If you want the last word in tractor-shovel performance on your jobs, you'll want the big HO or a smaller 4-wheel-drive "PAYLOADER".

PAYLOADER®
MANUFACTURED BY
THE FRANK G. HOUGH CO. LIBERTYVILLE, ILL.
SUBSIDIARY—INTERNATIONAL HARVESTER COMPANY

THE FRANK G. HOUGH CO.
735 Sunnyside Ave., Libertyville, Ill.

Send full information on "PAYLOADER" 4-wheel-drive tractor-shovels.

☐ model HO-2¼ cu. yd. ☐ model HH-1½ cu. yd. ☐ model HU-1 cu. yd.

Name_____

Title_____

Company_____

Street_____

City_____ State_____

MECHANIZATION

KEEPS PRODUCTION COSTS DOWN

ROCKBESTOS A.V.C.

MINING CABLE

KEEPS EQUIPMENT "ON THE GO"

Leading mine machinery manufacturers have for years wired their equipment such as continuous miners, loaders, cutters, shuttle cars, locomotives with Rockbestos A.V.C. as standard equipment.

Built to stand up and give the kind of trouble-free performance you need, Rockbestos A.V.C. . . . the felted asbestos wall construction . . . means less equipment down time and lower wire maintenance costs.

Rockbestos A.V.C. won't ignite or carry flame. It remains flexible and won't dry out or crack . . . safely takes conductor heating overloads. It won't bloom or rot when exposed to grease and oil. And it fits bushings right.

When buying new equipment or servicing old . . . be sure . . . specify Rockbestos A.V.C. Mining Cable.

ORDER FROM THESE JOBBERS — SPECIFY "ROCKBESTOS A.V.C."

BECKLEY, W. VA.	INDIANA, PA.
National Mine Service Co.	National Mine Service Co.
BIRMINGHAM, ALA.	JENKINS, KY.
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HARLAN, KY.	WASHINGTON, PA.
Kentucky Mine & Supply Co., Inc.	Fairmont Supply Co.
HUNTINGTON, W. VA.	WILLIAMSON, W. VA.
Banks-Miller Supply Co.	Williamson Supply Co.

ROCKBESTOS PRODUCTS CORPORATION

NEW HAVEN 4, CONNECTICUT

NEW YORK • CLEVELAND • DETROIT • CHICAGO • PITTSBURGH • ST. LOUIS
LOS ANGELES • OAKLAND CALIFORNIA • NEW ORLEANS

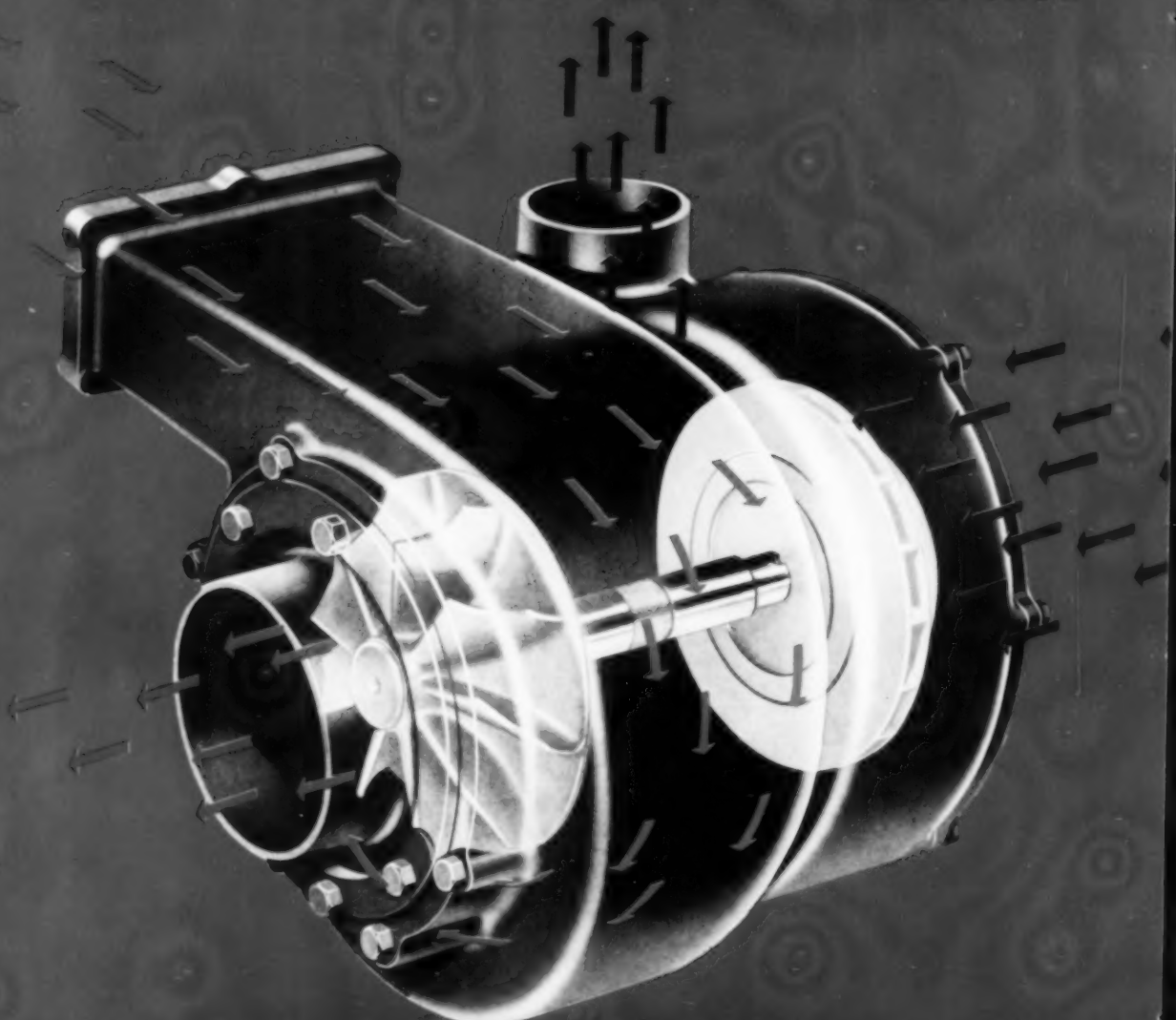
PERMANENTLY INSULATED ROCKBESTOS WIRES AND CABLES

NEW ADVANCE
IN DIESEL POWER

CUMMINS **TURBODIESEL** ENGINE

(trademark)

ONLY CUMMINS OFFERS A COMPLETE LINE OF *TURBODIESELS*!... THE LATEST AND MOST ADVANCED IMPROVEMENT IN DIESEL POWER!



Cummins ***TURBODIESELS*** convert ordinarily wasted power into usable power! This means more work from the same amount of fuel.

A *TURBODIESEL* is a Cummins engine that utilizes the normally wasted energy of exhaust gases by means of a turbocharger to develop additional horsepower. More power is obtained from a *TURBODIESEL* than from a naturally aspirated engine or engine of equal displacement, reducing the weight per horsepower. By forcing more air into the cylinders, the turbocharger makes possible more efficient burning of a greater fuel charge, creating additional horsepower.

➡ The red arrows trace the flow of exhaust gases through a turbine chamber which turn a turbine wheel (left). The turbine wheel is mounted on the same shaft as the air impeller (right) in the air chamber.

➡ The blue arrows indicate how the rotation of this impeller draws air from the outside and blows it under pressure into the intake manifold and engine cylinders.

and what it offers to power users!

LOWER FUEL CONSUMPTION

Cummins *TURBODIESELS* deliver greater fuel economy than either non-supercharged or mechanically supercharged gasoline or diesel engines.

MORE HORSEPOWER, BETTER PERFORMANCE

Cummins *TURBODIESELS* deliver more horsepower than non-supercharged or mechanically supercharged diesel engines of equal displacement.

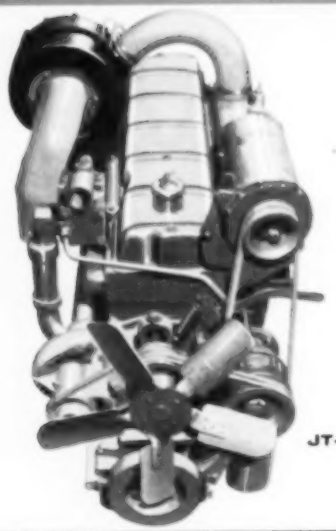
SMALLER SIZE, LOWER WEIGHT

Cummins *TURBODIESELS* are more compact, weigh less than non-supercharged or mechanically supercharged diesels of equivalent power.

How Cummins *TURBODIESELS* offer more profit to power users:

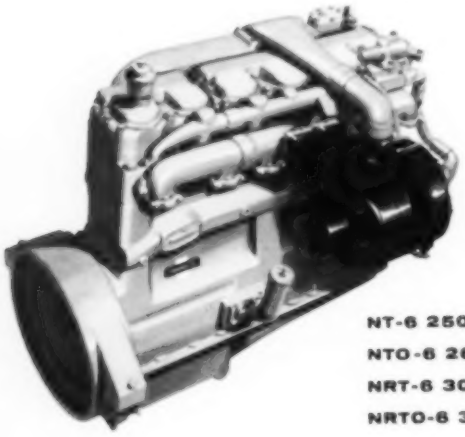
3 *big advantages!*	1 More work on the same amount of fuel!	2 More power for better performance!	3 More power per lb. of engine!
over non-supercharged diesels! ▶	If a non-supercharged diesel does this much work per gallon of fuel:	If a non-supercharged diesel delivers this much horsepower per cubic inch of displacement:	If a non-supercharged diesel delivers this much horsepower per pound:
and over supercharged diesels! ▶	a supercharged diesel will do this much work:	a supercharged diesel will deliver this much:	a supercharged diesel of equivalent weight will deliver this much power:
	but a Cummins *TURBODIESEL* will do more work per gallon of fuel than either!	but a Cummins *TURBODIESEL* will deliver more than either!	but a Cummins *TURBODIESEL* of equivalent weight will deliver more power than either!
* *If you run trucks or buses* ▶	"Work" is *mileage*. Cummins *TURBODIESELS* mean more ton-miles per gallon than gasoline or other diesel engines.	Cummins *TURBODIESELS* make possible faster schedules . . . better performance on hills . . . at altitudes . . . in traffic, than gasoline or other diesel engines.	Cummins *TURBODIESELS* make possible bigger pay loads . . . dependable diesel power and economy . . . more profit.
If you use construction, mining, logging, drilling or marine equipment ▶	"Work" is production. Cummins *TURBODIESELS* work longer on the same amount of fuel than gasoline or other diesel engines.	Cummins *TURBODIESELS* make possible faster work cycles . . . greater work loads . . . better all-around performance.	Cummins *TURBODIESELS* increase payload capacities . . . simplify movement to location . . . allow greater cargoes.

Cummins offers a full range of power for all applications!



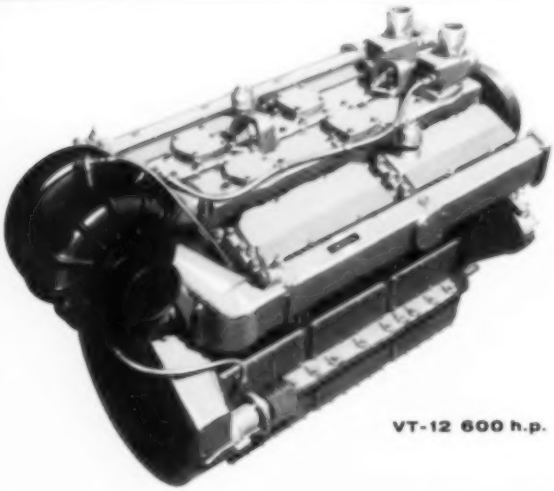
JT-6 175 h.p.

TRUCKS
BUSES
CONSTRUCTION
MARINE



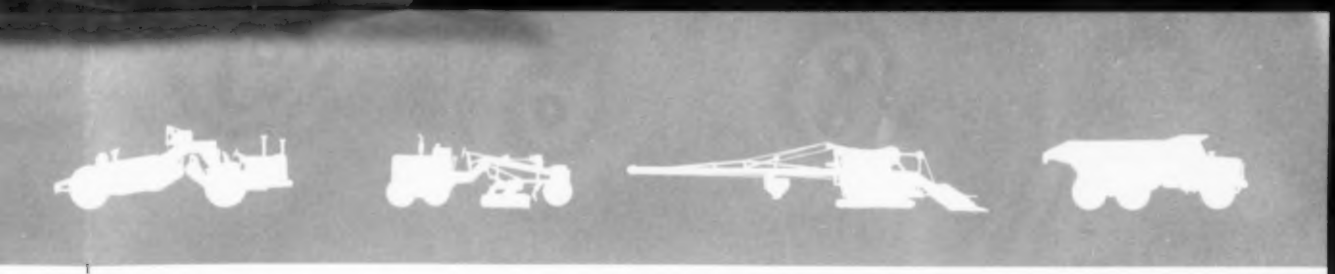
NT-6 250 h.p.
NTO-6 262 h.p.
NRT-6 300 h.p.
NRTO-6 335 h.p.

CONSTRUCTION
MINING
TRUCKS
LOGGING



VT-12 600 h.p.

MARINE
DRILLING RIGS
GENERATOR SETS
CONSTRUCTION



EFFICIENCY

Here is the engine that is revolutionizing the truck and bus industries. The JT weighs from 450 to 800 pounds less than other diesels of comparable power. This tremendous weight advantage means that diesel truck operators can earn from $1000 to $2000 in additional revenue every 100,000 miles. (Based on 300 trips of 300 miles each, and revenue of 80¢ per 100 lbs.)

More than 100 million miles of on-the-job performance have proved the JT's unmatched efficiency and economy as an automotive engine. The JT gives you maintenance costs lower than other diesels, *and as low as gasoline!* Compared to gasoline, the JT gives a 25% saving in maintenance hours!

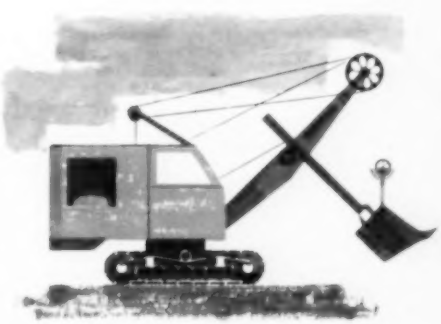
The JT also is ideal power for medium construction, mining or marine equipment. This engine delivers the rugged, dependable performance that cuts work cycles—lowers operating costs.

POWER

Any piece of equipment powered by an internal combustion engine in this horsepower range will operate more efficiently, and economically, powered by one of these four great Cummins *TURBODIESELS.*

Cummins gives you a choice of horsepower so that you can accurately tailor power to your job needs. This avoids the excessive initial costs inherent in overpowering . . . the excessive fuel and maintenance costs inherent in underpowering.

These four great *TURBODIESELS* are thoroughly job-proved. They are particularly popular in construction and mining equipment, where their big power makes possible faster work cycles and more payloads.



DEPENDABILITY

Here is big power in a compact package. No other commercially available engine of comparable horsepower approaches the VT-12 Cummins *TURBODIESEL* for light weight and small size. The VT is easily moved from one location to another. And it costs much less than heavier, slow-speed diesels which develop comparable horsepower.

The VT-12 *TURBODIESEL* can cut the cost in any installation which must be moved from location to location, such as an oil well drilling rig. It makes possible higher powered portable generator sets and pumping units. In marine applications, it frees valuable space for cargo carrying. The VT-12 can be compounded to provide up to 2,400 h.p.

and what it offers to power users!

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"Easy as filling a coffee bag," say men who prepare supply of Akremite.

Simple and safe to store, Akremite can be mixed right at the mine location.

"How We Cut Blasting Costs 50%, Increased Output 20%, with New Akremite Process"

Spencer prilled Ammonium Nitrate is base for new simple, safe, low-cost explosive

"We've found the new Akremite Blasting Process, now in use at our Cheshire, Ohio, operations, to be the ideal explosive for strip mining," reports F. H. Howe, Superintendent of Ohio River Collieries. "Because the ingredients are cheaper and the mixing process so much simpler, we have cut explosive costs 50% with Akremite. At the same time, better fragmentation produced by Akremite lets us move 20% more yards per month.

"The terrain in which we work is unusually difficult, but because Akremite is so safe and easy to handle, we still come out ahead."

☆ ☆ ☆

Akremite, the simple but revolutionary new explosive, is named after its inventor, R. I. Akre, superintendent of drilling at Maumee Collieries Co., Terre Haute, Ind. Akre uses prilled Ammonium Nitrate, produced by Spencer Chemical Company, as the base for his new explosive.

By itself, ammonium nitrate is not an explosive. But Akre found that if he mixed it with carbon black, packed it in a polyethylene bag, confined it in a drill hole and detonated it with a high gelatin dynamite and primacord, it produced a tremendous explosion.

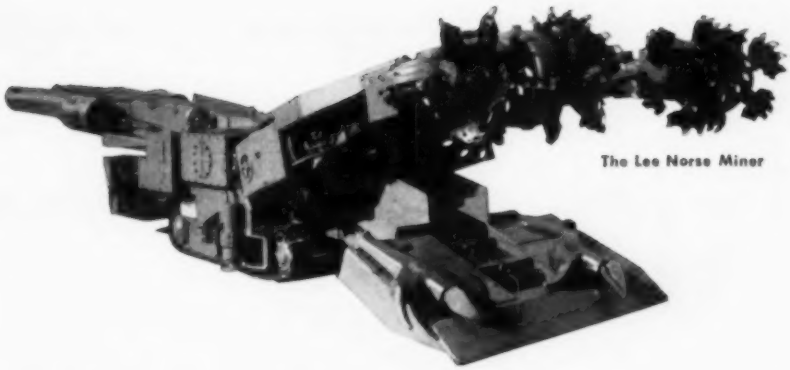
Recently, Southern Research Institute at Birmingham put Akremite through a series of safety tests. They fired bullets into bags of freshly made Akremite. And they conducted the regular pendulum-friction and modified propagation-through-air tests.

Not a single explosion, fire or crackling resulted from any of these tests. Akremite with Spencer prilled Ammonium Nitrate is not only cheaper and better, but many mines report it is the safest strip mine explosive they have ever used.

(NOTE: Spencer Chemical Co. will be happy to provide you with further information about the Akremite Method as discussed by Mr. Howe.)

SPENCER CHEMICAL COMPANY

610 Dwight Building • Kansas City 5, Mo. • BAltimore 1-6600



The Lee Norse Miner

70 tons of material per man at the face

Westinghouse SK motors stand up under tremendous loads and torque at Weirton coal

Mining operations, such as this cutting through tough Pittsburgh draw-slate, call for the rugged, dependable power that has made Westinghouse SK motors the first choice of the mining industry.

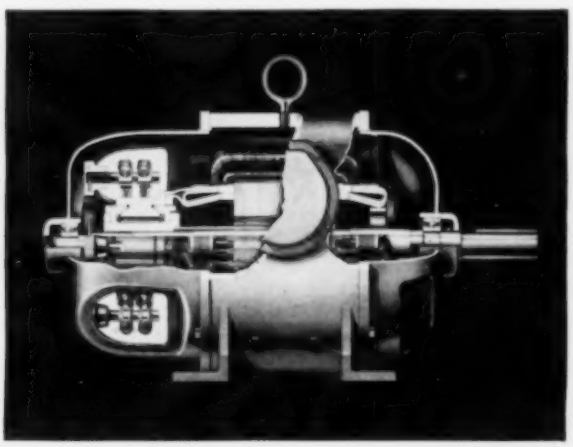
To get day-in, day-out production at Weirton and other mines, the Lee Norse Miner shown here needs *compact* power. Westinghouse answered this need by designing a special water-cooled, explosion-proof motor for more horsepower in a smaller space.

Get all the facts about Westinghouse SK motors, both standard and special, by calling your Westinghouse sales engineer today. J-21934

WATCH WESTINGHOUSE!

*WHERE **BIG** THINGS ARE HAPPENING **TODAY!***

The muscles of this Lee Norse Miner are three 40-hp, water-cooled, explosion-proof SK motors and two 10-hp, explosion-proof SK motors. All the cutting is powered by only two of the 40-hp units.



Westinghouse builds a complete line of SK motors for the mining industry. The dependability of SK motors comes from (1) 600-volt insulation, (2) large commutator bars, (3) heavy-duty cast brass brushholders, (4) 4-way, sealed-for-life bearings.

Haul underground.
KOEHRING COMPANY, Milwaukee 16, Wis.
Subsidiaries: PARSONS
KWIK-MIX • JOHNSON

. . or on the surface *with Dumptors*

Trackless mining — Hauling zinc ore from underground mine to railroad siding, 3 Koehring Dumptors ramp-load directly into cars. On this trackless haulage operation, the 6-yard Dumptors are loaded underground by a tractor-shovel. They travel along tunnel to an inclined haul-way, where they have an 1100-foot climb up 11½% grade to the mine entrance. Production for the 3 heavy-duty haulers has averaged 500 tons of ore a day — and the mine foreman reports that maintenance has been "almost nil". It's easy to see why. For one thing, Dumptors have no troublesome body-hoists. *Gravity* dumps the load — and gravity-dump never balks, never wears out.

14 Dumptors in one mine —

On extensive open-pit stripping to uncover lithium deposits, rocky overburden is hauled by a fleet of 14 Koehring Dumptors. They also carry ore from pit to stockpile. Excavating is handled by tractor-type loaders and power shovels. Notice how Dumptor's big square body opening and low rear entry permits fast loading over the end or sides.

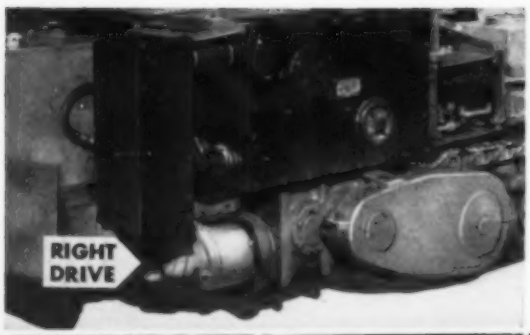
Up-hill haul all the way —

Teamed with a Koehring 1½-yard shovel, 3 Dumptors haul up steep grade out of pit, then climb ramp to dump. These off-road 6-yard Dumptors have better than 6 h.p. per ton of loaded weight. They accelerate fast, pull through soft ground, up grades with less shifting, climb 24% grades fully loaded.

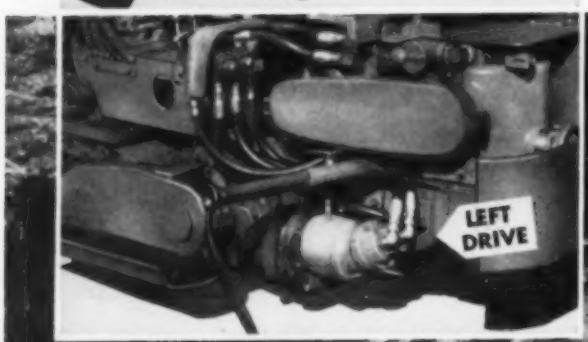
Prospecting for pay dirt —

At exploratory mine in the Rocky Mountain region, Dumptor goes underground, shuttles in and out of access tunnel without turning. There's no need to turn, because Dumptor has 3-speed travel in either direction — operates with equal ease coming or going. It's as efficient underground as it is on overhead trestles, or hauling along the surface.

If your work involves hauling rock, gravel, ore and other materials under difficult conditions, let your Koehring distributor show you what this 6-yard heavy-duty Dumptor® can do for you.



NOW... "HYDRAULIC DRIVE" on the Whaley "AUTOMAT"



—no brakes
—no clutch
—variable speed
forward and reverse
50 to 100 ft. per minute

Now you can have a Crawler Type Loading Machine with a new, revolutionary Hydraulic Drive Mechanism.

No other loader has ever approached the mechanical endurance of the Whaley Automat for consistent, economical, year-in, year-out service for rock loading. And now with its new Hydraulic Drive, you have available the most efficient, smoothest operating, trouble free off track loader for heavy duty rock work ever produced. Right and left Crawlers are independently operated by finger tip controls and at variable speeds from 50 to 100 feet per minute. Clutches and brakes have been eliminated.

And remember, the Whaley "Automat" is the only loader continuous mining machines cannot replace. If you use these machines you still need the "Automat" for driving entries, brushing, etc. For every dollar saved in dead work is reflected ultimately in the profits of production work.

IMPORTANT: For those mines now equipped with Whaley "Automats" . . . conversion to our new Hydraulic Drive is readily available. One leading mine is now converting four of their machines.

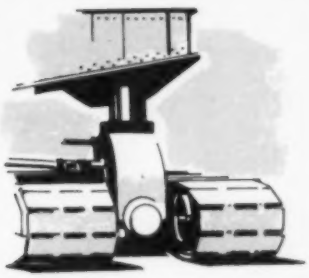
MYERS-WHALEY Knoxville, Tenn.

How to cut mining maintenance costs

Use STANOIL Industrial Oil—save these three ways

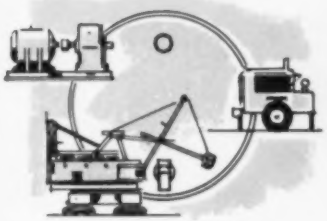
1 Reduce oil inventories

STANOIL Industrial Oil can be used in so many places that you can reduce inventories of special oils. Add to this the economy of simplified storage and handling. Use STANOIL Industrial Oil in electric motors, air compressors, fans, blowers, transmission and clutch lubrication, and hydraulic systems. Use STANOIL to lubricate bearings either in direct application or in oil circulating systems.



2 Get better lubrication

Special solvent-refining techniques plus the blending in of exclusive additives make STANOIL the finest industrial oil. STANOIL resists chemical change . . . lubricates effectively and completely over a wide temperature range . . . cuts wear. It protects oil systems from troubles due to carbon deposits, corrosion and emulsion. It stands up under heavy and repeated shock loads. STANOIL has high oxidation stability and extremely low carbon forming tendency.



3 Prevent application mistakes

When there is only one lubricant, there can't be any chance of the wrong one being used. With STANOIL, errors in application that would result in breakdowns are eliminated; equipment stays in service longer; maintenance is easier; overhauls go more smoothly and equipment is back in service faster.

Get more information about STANOIL Industrial Oil. Call your Standard Oil industrial lubrication specialist. He is experienced in mine lubrication. There is one near you in any of the 15 Midwest and Rocky Mountain states. Or write, Standard Oil Company, 910 South Michigan Avenue, Chicago 80, Illinois.

STANDARD

STANDARD OIL COMPANY
(Indiana)

Quick Facts About

STANOIL Industrial Oil

- **Stability**—STANOIL's antioxidant gives oil resistance to chemical change, minimizes deposits.
- **Rust Prevention**—The inhibitor in STANOIL "plates out" on metal surfaces, prevents corrosion.
- **Cold Starts**—STANOIL has low pour point. Flows freely from cold start. No need for costly warm-ups.
- **Resists Effects of Temperature Change**—STANOIL has high viscosity index, resists temperature change.
- **Has Excellent Demulsibility**—STANOIL is refined to eliminate emulsion problems, contains additive to minimize foaming.

HOW DO YOU MEASURE ROOF BOLT PERFORMANCE?

When you enter an order for mine roof bolts, you are really buying a given degree of security for a given area of your mine roof. And, all other factors being equal, the security you get depends on the performance of the bolts you choose. But how do you measure performance?

One way is to analyze and test every bolt you buy. However, a far more practical yardstick is simply to know your boltmaker. Know his design and manufacturing skill. Know the extent of his quality control program. These are the keys to performance.

And, when you've compared them for all manufacturers, you'll see why Republic is your best roof bolt buy.

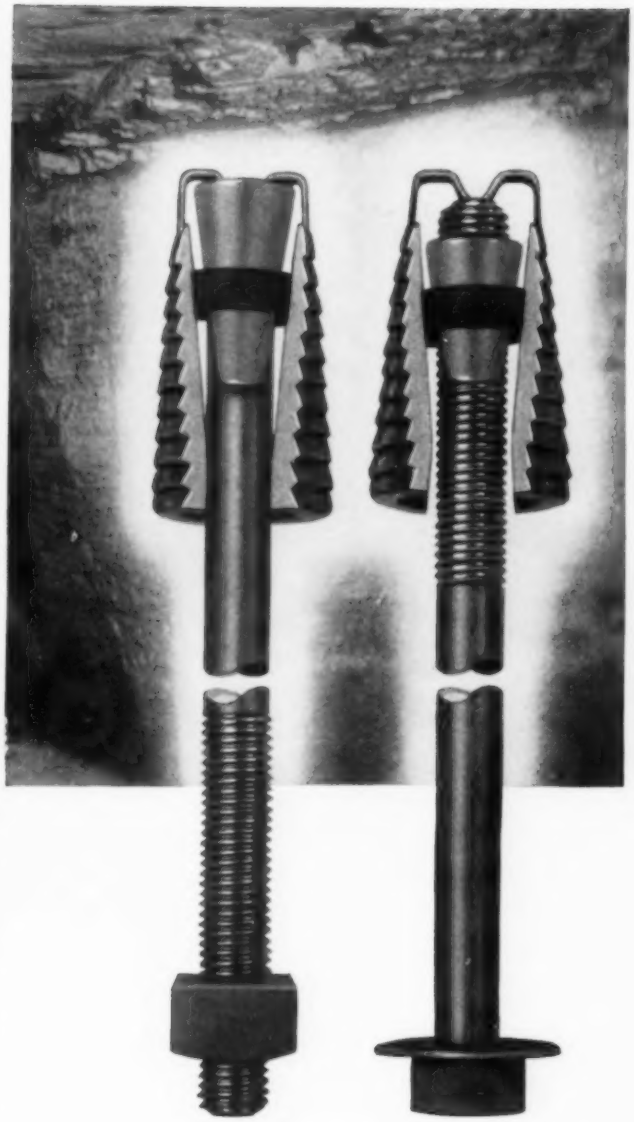
Designing and manufacturing skill are a tradition at our Bolt and Chain Division. Know-how accumulated in more than a century of manufacturing headed and threaded products, backs every Republic Mine Roof Bolt. In addition, as a basic producer of steel, Republic knows *and can produce* the analysis best suited for each fastener application. Quality control extends from raw ore to finished product.

So to assure maximum security of your mine roof, specify maximum performance you can count on—Republic Mine Roof Bolts. Contact your Republic representative. Or mail the coupon today for illustrated literature.

REPUBLIC

REPUBLIC STEEL

World's Widest Range of Standard Steels



IN-SERVICE PERFORMANCE of each type of Republic Mine Roof Bolt Assembly is thoroughly verified in our own mines before any design is released. In addition, Republic alone is able to offer all four major classifications of roof bolt assemblies—plus technical assistance to help you select the right type and install it properly. Inset above shows our most versatile assemblies: the exclusive forged wedge head bolt, and the square head bolt with wedge nut and rigid expansion shell.

PUMP CONTROL PERFORMANCE is protected by this ready-made Truscon® Steel Building. It provides a safe, tamper-proof housing assuring reliable operation of the deep well pump used to remove mine water. Truscon Steel Buildings are mass-produced in a wide range of standard designs. Low in cost and quickly erected, they can be easily dismantled and re-erected to meet changing needs.

CORROSION-RESISTING PERFORMANCE of Republic Flexible Plastic Pipe has been proved in this mine-water handling application. Original piping installed was knocked out within six weeks by acid condition of the water. The four-inch plastic pipe shown has been in service twelve times as long and shows no sign of damage. Mail coupon for further information.

ABRASION-RESISTING PERFORMANCE of Republic High Strength Steel makes it ideal for use in these raw coal discharge chutes. Beyond their ability to withstand continual pounding and abrasion in loading of cars, chutes of high strength steel are also lighter in weight and many times more corrosion-resistant than similar equipment made of plain carbon steel. Send coupon for further information, now.

STEEL

and Steel Products

REPUBLIC STEEL CORPORATION
Dept. C-1828
3124 East 45th Street, Cleveland 27, Ohio

Please send me further information on:

☐ Mine Roof Bolts ☐ Republic Plastic Pipe
☐ Truscon Steel Buildings ☐ High Strength Steels

Name_____ Title_____

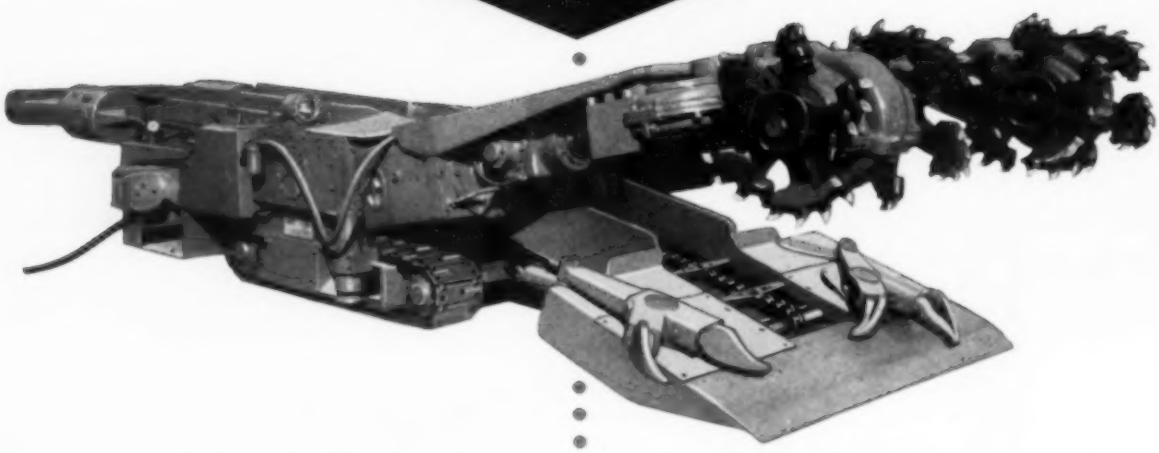
Company_____

Address_____

City_____ Zone____ State_____

8 important REASONS why you should choose the

Lee-Norse MINER



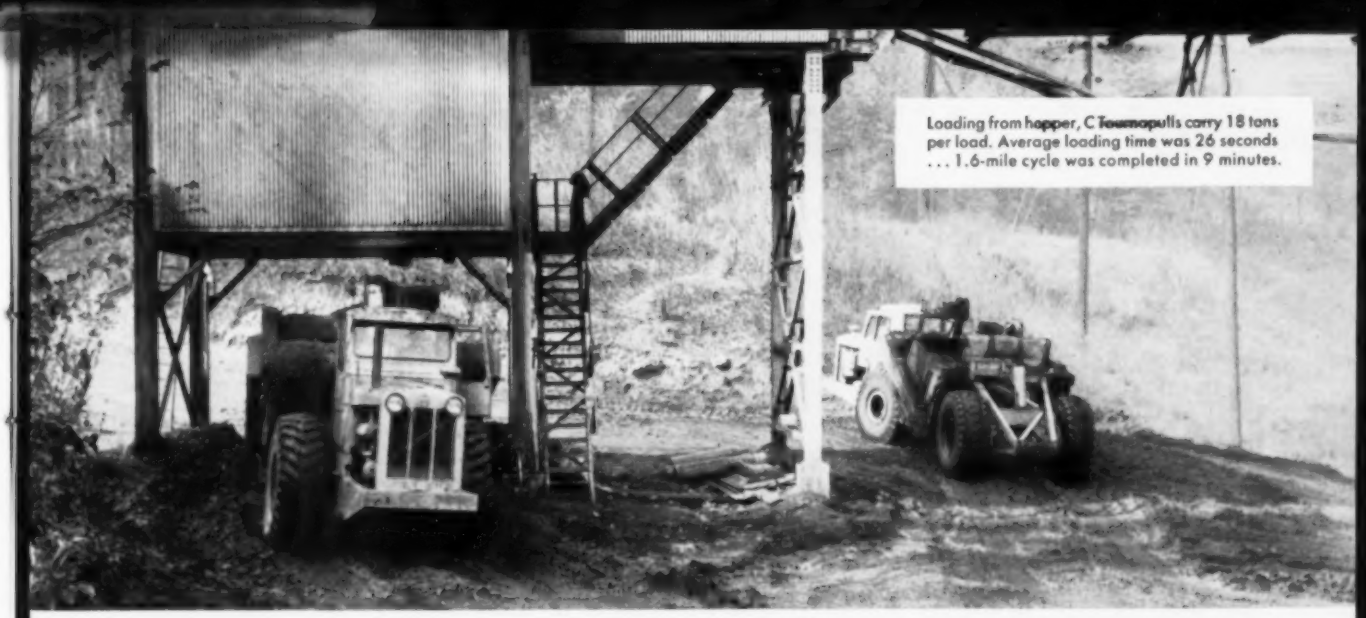
1. The Lee-Norse Miner cuts and loads coal at a rate of 2 to 3 tons per minute.
2. The Lee-Norse Miner is the only machine that cuts continuously a "DIAMOND PATTERN" in the face of the coal. This new and unique method of cutting coal produces "Coarse Cuttings" and less fines.
3. The Lee-Norse Miner is built like a modern Coal Loading Machine with improved "DUAL" gathering arms and flexible conveyor and with the exclusive Lee-Norse Cutter Head, which cuts from the roof down to the floor and gathers all the coal as it is cut.
4. The Lee-Norse Miner operates with the same electric power, now provided for conventional mechanical mining—No need for larger power facilities.
5. The Lee-Norse Miner, built like a flexible, mobile loader, has excellent clean-up . . . no need for auxiliary loading machine.
6. The Lee-Norse Miner is designed for easy maintenance. All gear drives, electric motors and hydraulic pump and motors are located on the outside, where they can be attended to quickly. No swinging head or turntable -no chain drive-makes for less maintenance.
7. The Lee-Norse Miner has "Low Bit Cost" due to the solid mounting of cutter bits and unique method of cutting coal.
8. The Lee-Norse Miner is well proportioned in size and weight to suit present day mining conditions. With simple control and high tramming speed it operates and moves like a modern mobile loader and not like a semi-stationary miner.

Write today for literature:

Lee-Norse Company

CHARLEROI, PA.

Specialists in Coal Mining Equipment



Loading from hopper, C Tournapulls carry 18 tons per load. Average loading time was 26 seconds . . . 1.6-mile cycle was completed in 9 minutes.

"Twice as much material . . . twice the distance . . . at half the cost"

New 18-yd. FULLPAK: All-new lower, wider C Fullpak Scraper loads faster, easier . . . hauls even more heaped pay-yards than rigs shown in this job report. New Fullpak design packs load in corners, gives live boiling action that heaps 18-yd. pay-loads fast for greater yards-per-hour dirt-moving profits!

That's how Peter Debaldo, of Debaldo Bros., Glenshaw, Pennsylvania, compares his C Tournapulls to trucks on the removal of "boney" waste material at a progressive coal mine in Hammarville, Pa. After the waste material is separated from the coal it is carried by conveyor to a hopper for loading. Here's how 2 rubber-tired C Tournapulls speed this disposal.

18 tons per load

Each "C" drives beneath hopper-bin where "boney" material is stored. Operator gets out and pulls hopper-lever, loading about 18 tons into scraper-bowl. After loading, "C" hauls about 0.8 mile to waste-dump area, where it spreads the "boney". Haul, which is up grades to 13%, is dusty during summer months . . . muddy and slick at other times.

2000 tons daily

The "C's" haul and dump about 2000 tons of waste material daily. Because of their speed and versatility, cycle time (including 26 seconds to load) averages only about 9 minutes on the 1.6-mile trip.

With coal mining operations on a 24-hour day basis, the "C's" are kept busy loading and hauling most of the time. The only time Tournapulls are idle is when waste material is removed from bins faster than mine can supply it.

Likes "C's" performance

Owner Debaldo said, *"No other machine can compare to the 'C' in hauling the amount we do over these haul roads."* Chief Mechanic Chester Aber added, "These 'C's' are the easiest machines to maintain."

Why not find out how the versatile "C" can save time and money for you? Ask us now about the new, bigger, 18-cubic-yard C Fullpak Scraper, too. It's an even better dirtmover! We'll be glad to give you facts and figures on these high-production rigs any time.

Adams 440 motor grader maintains mine haul road. Despite heavy muck, which made road slick, the 440 kept roads smooth and level.

Spreading on the run, C Tournapull dumps 18 tons of "boney" material in smooth layer at waste-dump in a matter of seconds.

Fullpak—Trademark, Tournapull—Trademark Reg. U.S. Pat. Off.

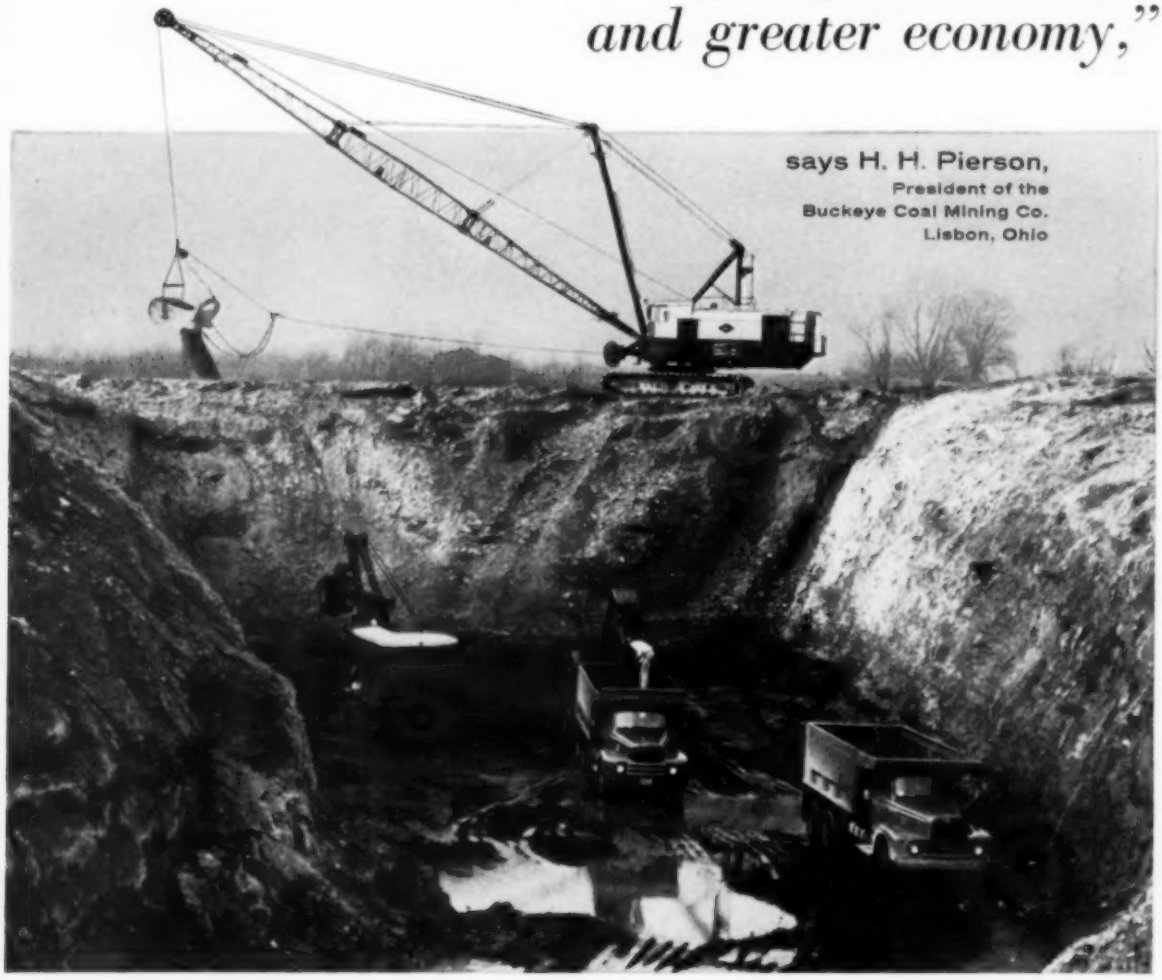
P-996-M-b

LeTourneau-WESTINGHOUSE Company

Peoria, Illinois

A Subsidiary of Westinghouse Air Brake Company

"GULF DIESELECT FUEL *gives us smoother engine performance and greater economy,"*



"Gulf Dieselect Fuel gives us quick engine starting in our heavy equipment, even in sub-zero temperatures," says Mr. Pierson. "We also appreciate the smoother engine performance and greater power, which we attribute to the clean-burning qualities of Gulf Dieselect. It helps us reduce maintenance costs."

Every day more strip mine operators like the Buckeye Coal Mining Company are switching to Gulf Dieselect Fuel. They're discovering it's the best fuel choice they can make for their diesel engines. Here are some of its outstanding advantages:

● 100% straight run distillate ● Clean burning —does not form harmful deposits in tanks, filters, and injectors ● High volatility ● High cetane index ● Low end point ● Minimum smoke

Because it is so clean burning, Gulf Dieselect helps prevent fouling of oil control rings and reduces ring sticking. And because of its high volatility, it vaporizes quickly and burns evenly, completely, so you can be sure of cleaner valves.

Give us a chance to prove that Dieselect can do a better combustion job for you. Contact your nearest Gulf office today.

GULF OIL CORPORATION
1822 Gulf Building

GULF

GULF REFINING COMPANY
Pittsburgh 30, Pa.

THE FINEST PETROLEUM PRODUCTS FOR ALL YOUR NEEDS

TOURNATRACTOR is a 208 hp tractor that *runs* on rubber instead of *crawling* on tracks.

Since its *introduction in 1946*, this electric-controlled tractor has been used successfully in every kind of climate, terrain, material, and on every type of tractor application, all around the world, by *thousands of owners.*

Their *job records prove* that Tournatractors can outwork crawler-tractors by as much as 2 to 1 where job conditions allow the use of its higher speeds.

Remember, too, that for this extra speed and greater production capacity, plus all the other "bonus" Tournatractor advantages described below, *you invest no more,* and *pay less for operation and maintenance,* than for any crawler-tractor of similar power.

Does speed fit your job?

Check these advantages for your mine!

Speed on the job...
Tournatractor pulls, dozes, pushes at speeds 2 to 3 times faster than any crawler. You change gears instantly, waste no time shifting, go up to 8 mph in reverse.

Mobility between jobs...
Tournatractor travels job-to-job at high rubber-tired speeds. Big, low-pressure tires drive anywhere—you need no planking or trailers—have no loading or unloading delays.

Lower maintenance...
Lubrication takes only a few minutes a shift on Tournatractor as compared to 15 minutes or more on a crawler. No cleaning of tracks, grousers, and other fittings.

Fewer repairs...
A set of tires or tracks costs about the same. But tires last 2 to 3 times longer than tracks under most conditions . . . without the usual maintenance expenses.

Ample flotation, traction...
Each tire grips area approximately 2 feet wide. Lugs bite deep to give plenty of traction. Low-pressures increase flotation, absorb shocks, aid compaction.

Less loss of power...
208 hp diesel drives through dirt-sealed anti-friction bearings to free-rolling wheels. All gears and bearings automatically lubricated . . . all parts easily accessible.

Shifts instantly...
Constant-mesh transmission eliminates delays in changing gears . . . saves vital momentum . . . gives you any gear ratio instantly.

Torque converter available...
This simple, dependable, low-pressure system provides the equivalent of an infinite number of gear ratios automatically selected to best balance load and torque.

Easier to operate...
Less jolt and jar reduces stress and strain on both operator and machine. Fingertip electric controls let operator work faster, with less end-of-shift fatigue.

Improves safety...
Low center of gravity, all-around visibility, quick response of controls make Tournatractor exceptionally safe to operate. Multi-disc air brakes have more than *4 times* the braking surface of most big tractors and trucks.

Interchangeable equipment...
Bulldozer, Angledozer, Root Rake, Snow Plow—all interchangeable—may be mounted on Tournatractor. Tilt mechanism and down-pressure attachment also available.

Easy to keep busy...
Stripping overburden, pushing scrapers, cleaning up around shovels, or handling a wide variety of utility jobs around the pit, Tournatractor's speed and power will save you time and money.

Call or write us for a Tournatractor demonstration on your job. See for yourself the advantages of this versatile, high-speed, rubber-tired tractor.

Tournatractor—Trademark Reg. U.S. Pat. Off. T-733-M-b

Tournatractor pulls Carryall-Scrapers twice as fast as crawler-tractors. Hauls more in less time.

Versatile rig combines power and fast-positioning for efficient push-loading in any materials.

Tournatractor utilizes mobility and speed for quick clean-up around shovels and on pit floor.

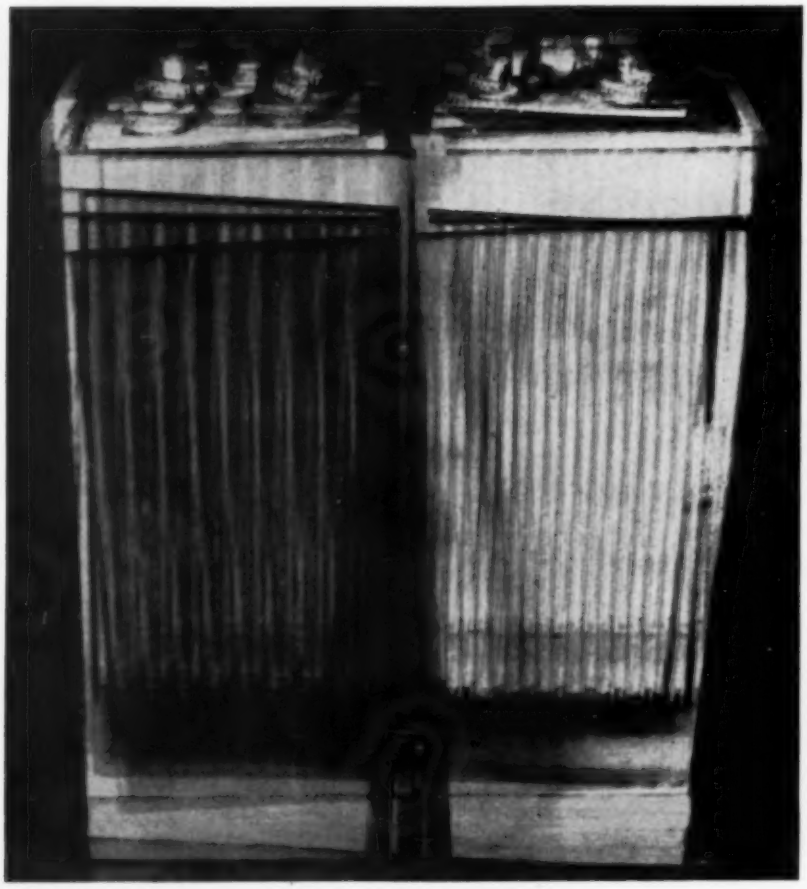
LeTourneau-WESTINGHOUSE Company

Peoria, Illinois

A Subsidiary of Westinghouse Air Brake Company

EXIDE-IRONCLAD BATTERIES

For all mining applications



Actual photo taken during vibration torture test on an Ironclad Battery

Section of Ironclad positive plate

Vibration can't loosen active material — can't shorten battery life

BATTERY FOR MINE LOCOMOTIVE. Exide-Ironclad Model MVM. Write for copy of Bulletin No. 5161.

When a heavy duty storage battery gets the "shake treatment," battery life is literally at the mercy of the bond between the positive grid and the active material. Heavy shedding means short life.

But look what happens in an Exide-Ironclad Battery. Active material is held firmly captive inside the plastic power tubes. Hair-thin slits let electrolyte in, but keep active material from falling out. In prolonged vibration tests, this unique design has proved to be a valuable battery life stretcher. These findings are confirmed in the long, dependable service of Exide-Ironclad Batteries in typical high-vibration applications.

This superior performance is only one of the many extra advantages in Exide-Ironclad Batteries — advantages that have earned them an unmatched reputation for long life and high capacity. When you order heavy duty batteries, or the equipment that requires them, be sure to specify Exide-Ironclad. Write for detailed bulletin. Exide Industrial Division, The Electric Storage Battery Company, Philadelphia 2, Pa.

Exide®

H&L Teeth that really DIG

SHARP teeth mean more production

FORGED ALLOY STEEL NOT A CASTING means greater strength

added up means more profit

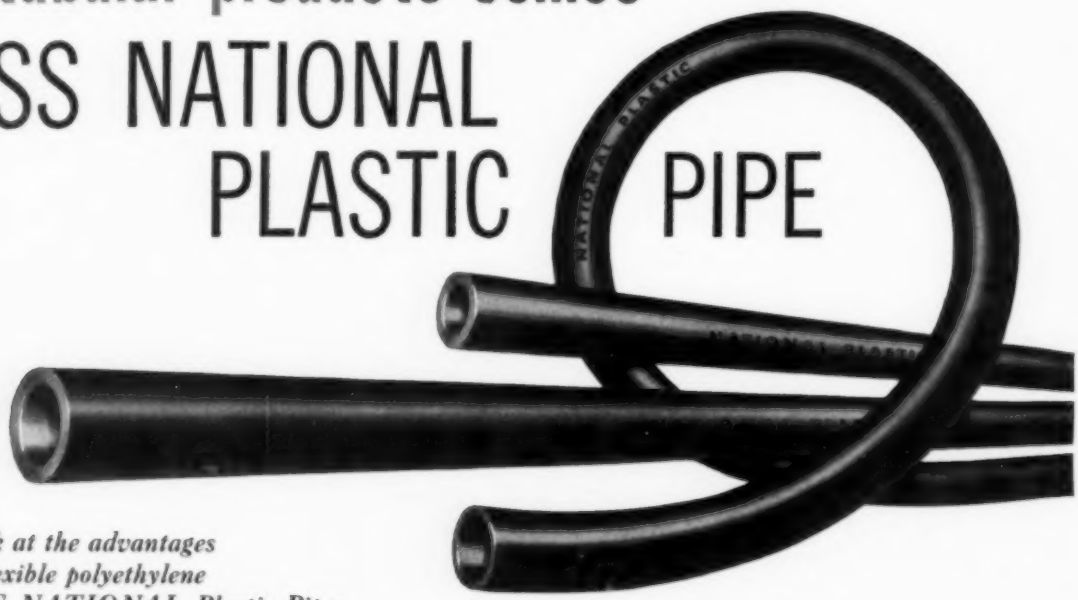
H&L TOOTH COMPANY

1540 South Greenwood Avenue
Montebello, California

25th Silver Anniversary

From the world's foremost manufacturer of tubular products comes

USS NATIONAL PLASTIC PIPE



Look at the advantages of flexible polyethylene USS NATIONAL Plastic Pipe:

- Resists attack by rust, corrosion, acids, alkalies, salts, and other chemicals.
- Extremely tough—resists cracking and breaking due to rough handling, even at very low temperatures.
- Retains its toughness and flexibility over its entire working range from minus 90°F to plus 120°F.
- Lightweight, easy to carry, easy to handle—a 200-foot coil of 2-inch USS NATIONAL Plastic Pipe weighs only 86 pounds.
- Very low flow resistance, due to the smooth inside surface and non-wetting properties of polyethylene. Smooth interior also prevents the accumulation of deposits.
- Simple to install. The long continuous lengths of USS NATIONAL Plastic Pipe require few joints. When joints are used, they are of the insert type, quickly secured with stainless steel clamps. Light, flexible USS NATIONAL Plastic Pipe is easy to handle, thus requiring less installation time.

USS NATIONAL Plastic Pipe is available in sizes from ½-inch to 6 inches in diameter, in a variety of wall thicknesses. It is sold and serviced by the same distributor organizations that handle USS NATIONAL Steel Pipe. For further information, write to National Tube Division, United States Steel Corporation, 525 William Penn Place, Pittsburgh 30, Pa. Ask for Bulletin No. 29.

SEE The United States Steel Hour. It's a full-hour TV program presented every other week by United States Steel. Consult your local newspaper for time and station.

NATIONAL TUBE DIVISION, UNITED STATES STEEL CORPORATION, PITTSBURGH, PA.

COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS • UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS NATIONAL *plastic* PIPE

UNITED STATES STEEL

NEW International® Payhaulers

for years a leader in the manufacture of heavy-duty construction equipment, International now offers you the same fine engineering and rugged dependability in

OFF-HIGHWAY HAULERS

MODEL **95** 24 TONS

TWO **ALL NEW** MODELS

MODEL **65** 18 TONS

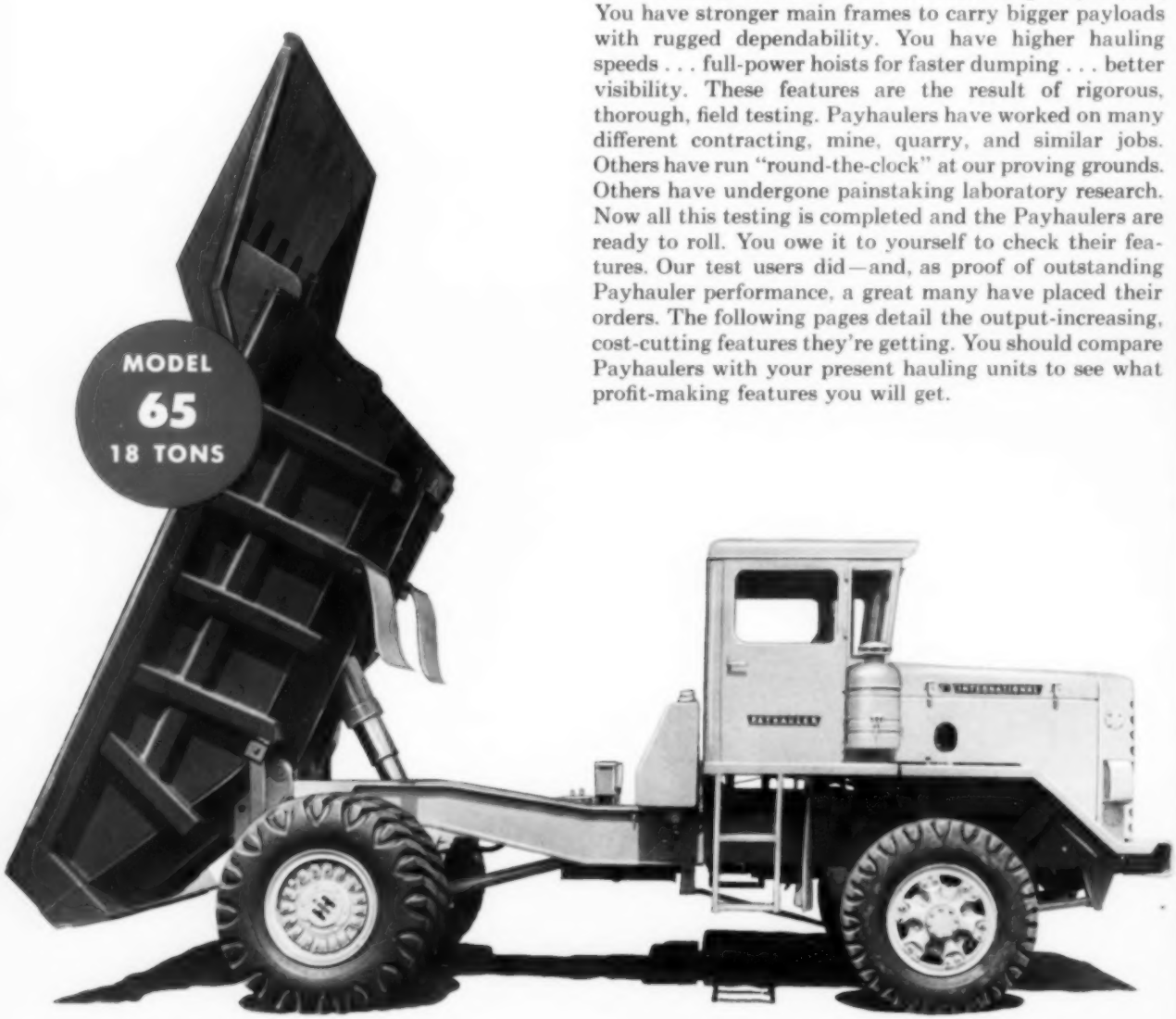
NEW RUGGEDNESS - POWER - COMFORT - ECONOMY

Announcing the **NEW**

Designed with features you asked for

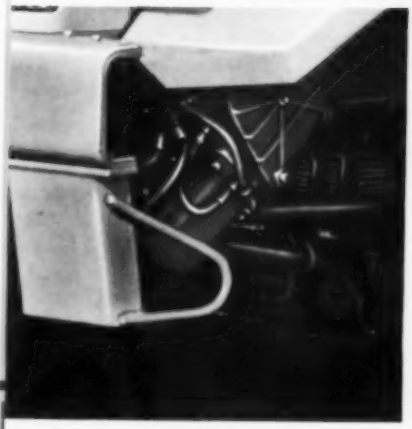
250-335 HP Turbo-Charged Diesel Engines
Rugged, Welded, All-Steel Frame
Full-Floating Axles Planetary Drive
Speeds to 38 MPH
Power Shift Transmission

Hundreds of contractors, mine owners, quarry operators, and other equipment users told our engineers what they needed in an off-highway hauler. Their suggested design features have been carefully built into the new International Payhaulers. In these rugged, all-new, rear-dump haulers, you have greater horsepower-to-payload weight ratios than are available in most other off-highway trucks. You have stronger main frames to carry bigger payloads with rugged dependability. You have higher hauling speeds . . . full-power hoists for faster dumping . . . better visibility. These features are the result of rigorous, thorough, field testing. Payhaulers have worked on many different contracting, mine, quarry, and similar jobs. Others have run "round-the-clock" at our proving grounds. Others have undergone painstaking laboratory research. Now all this testing is completed and the Payhaulers are ready to roll. You owe it to yourself to check their features. Our test users did—and, as proof of outstanding Payhauler performance, a great many have placed their orders. The following pages detail the output-increasing, cost-cutting features they're getting. You should compare Payhaulers with your present hauling units to see what profit-making features you will get.



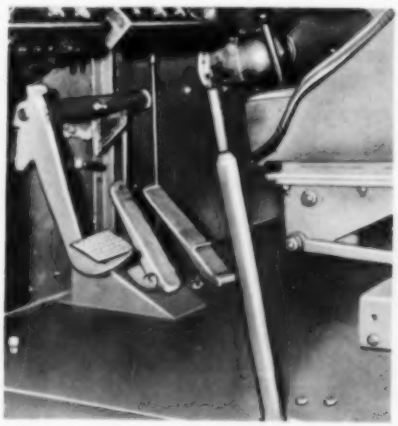
Designed for operator comfort easier operation

Driver looks through giant windshield, has picture window vision ahead and to both sides. When backing into close quarters, he need only open door and look around; offset cab gives unobstructed view to rear. Vents at top, bottom, and rear of cab provide a cool "office" for the operator.



Power Steering. No broken thumbs in the new International Payhaulers! Hydraulic boost gives operator power-steering control on haul roads—effortless steering when spotting under shovels.

The Driver "Takes It Easy" in the comfort-designed Payhaulers. He sits in a leather-covered, bucket-type, fully-adjustable seat. Jars and jolts are cushioned through compression spring, hydraulic shock absorber. He handles center-grouped, easy-to-reach controls. Clean floor with suspended brake pedal, handy hoist lever location make the operator's job even easier.



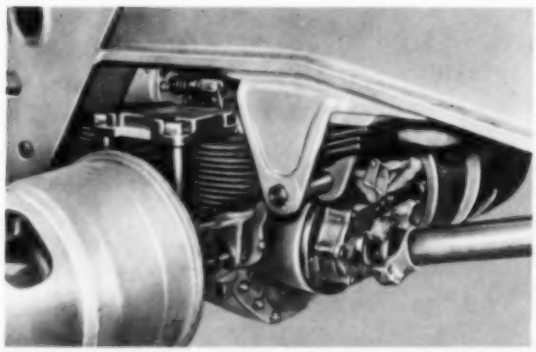
Accessible Service Checks. Outside mounting speeds air cleaner servicing. Inspection port in hood permits ready access to oil dip stick and filler pipe. Lightweight aluminum side sheets are easily removed for engine inspection.

Full Day's Fuel Supply. There's no need to slow down a Payhauler job for refueling. These big haulers pack 125 gallons, enough fuel for a full day's operation on most jobs. Filter-type breather caps and built-in strainers help keep fuel clean and grit-free.

International® Payh

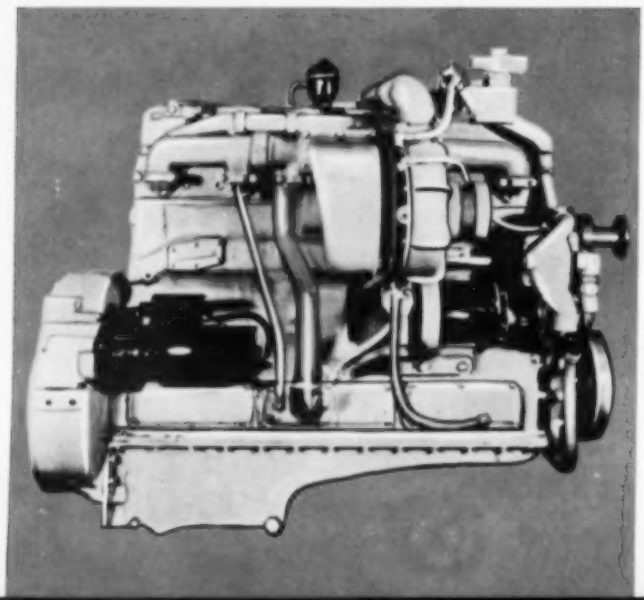
Rock-rugged

Rugged Frame. Built of heavy-duty welded and conventional "I" beams with web thicknesses of ½ and ¾ inches, Payhauler main frames have the strongest section modulus known of any off-highway truck. Rear-frame section of rolled "I" beams is held rigid by tubular torque and hoist mounting members. Front frame sections flex with shock loads through channel bumper torque member.



Free-Floating Springs. *From the ground up, Payhaulers pack extra strength for outstanding performance on rugged jobs.* Semi-elliptic, multiple leaf, free-floating springs effectively "swallow" the shocks of loading from big shovels and of high-speed hauling over rough ground. Heavy-duty, radius rods keep springs and axles in position.

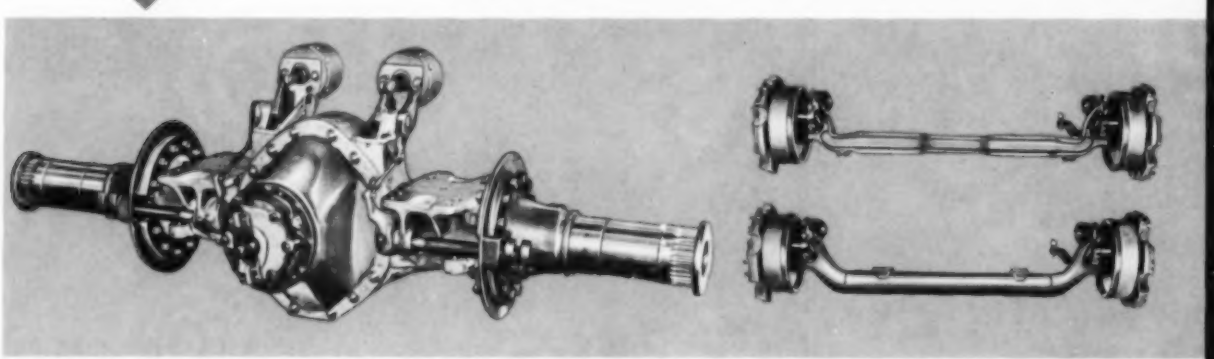
Pay-off powered

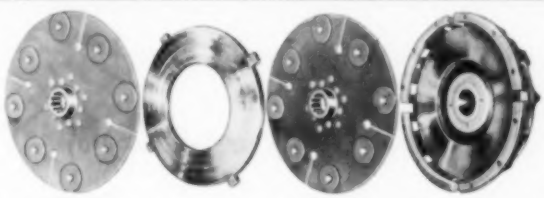


Both the "65" and "95" Payhaulers have more horsepower per struck yard than any other truck in their size class. The 24-ton, 16-yard "95" is powered by a 335 hp diesel . . . the 18-ton, 12-yard "65" is powered by 250 hp engine. Turbo-charging keeps power high, weight low, reduces fuel consumption 10% or more. Large radiator (below) with 1425 sq. in. of area plus powerful 32-inch fan insure proper engine cooling under all job conditions. Suspended on four large rubber mounting pads, the Payhauler radiator is protected against shock.

yhaulers

Sturdy Axles. Durable axles help Payhaulers carry 36,000 to 48,000 lbs. smoothly, comfortably at speeds up to 38 mph. Note the massive differential housing with in-built spring mounting pads. Heavy-duty, rear axle housings bolt to the differential to provide top load carrying capacity. Front axles are equally sturdy—of forged or tubular design.



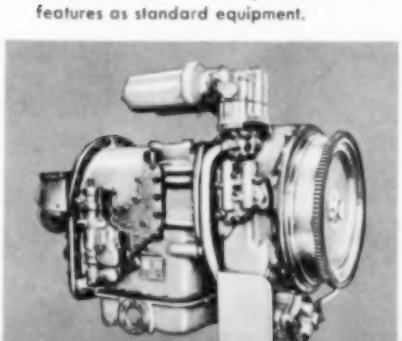


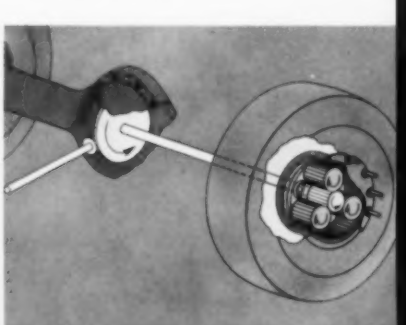
Cerametallic Clutch. In gear-drive models, cerametallic clutch facings virtually eliminate over-heating. This clutch, made of heat-defying material, needs fewer adjustments, gives longer life, smoother action than any other clutch in the off-highway truck field.

Torque Converter. The 24-ton Model 95 Payhauler is available with a 4-speed Torque Converter transmission for smooth speed changes from 4.8 to 38 mph. A lock-up clutch for direct drive performance and a Torqmatic brake system are standard with the versatile Torqmatic transmission. No other truck provides these features as standard equipment.

Conventional Transmission. You have a choice in the "65" Payhauler of a 5 or 10-speed geared transmission to fit job conditions—speed ranges are from 3.5 mph to 36.5 mph for either. In the "95" Payhauler, a 9-speed transmission provides an excellent range of speeds from 2.6 to 37.2 mph. Operators especially like the single lever air-assisted shift control.

Planetary Final Drive. Both Payhaulers translate engine power into big load handling capacity through a rugged differential to planetary drive wheels. Sun gear is integral with full-floating axles for greater strength and simplified maintenance.

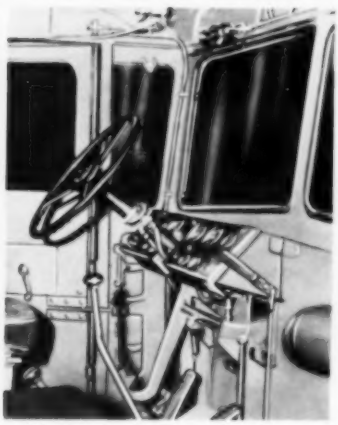




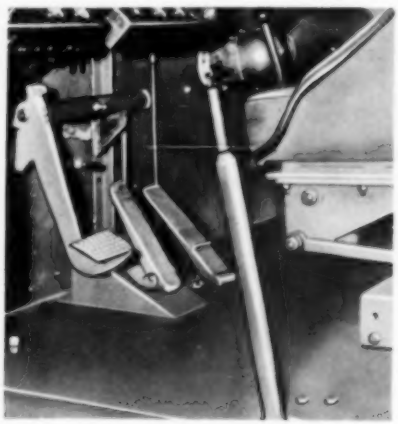
Designed for operator comfort easier operation

Driver looks through giant windshield, has picture window vision ahead and to both sides. When backing into close quarters, he need only open door and look around; offset cab gives unobstructed view to rear. Vents at top, bottom, and rear of cab provide a cool "office" for the operator.

Power Steering. No broken thumbs in the new International Payhaulers! Hydraulic boost gives operator power-steering control on haul roads—effortless steering when spotting under shovels.



The Driver "Takes It Easy" in the comfort-designed Payhaulers. He sits in a leather-covered, bucket-type, fully-adjustable seat. Jars and jolts are cushioned through compression spring, hydraulic shock absorber. He handles center-grouped, easy-to-reach controls. Clean floor with suspended brake pedal, handy hoist lever location make the operator's job even easier.

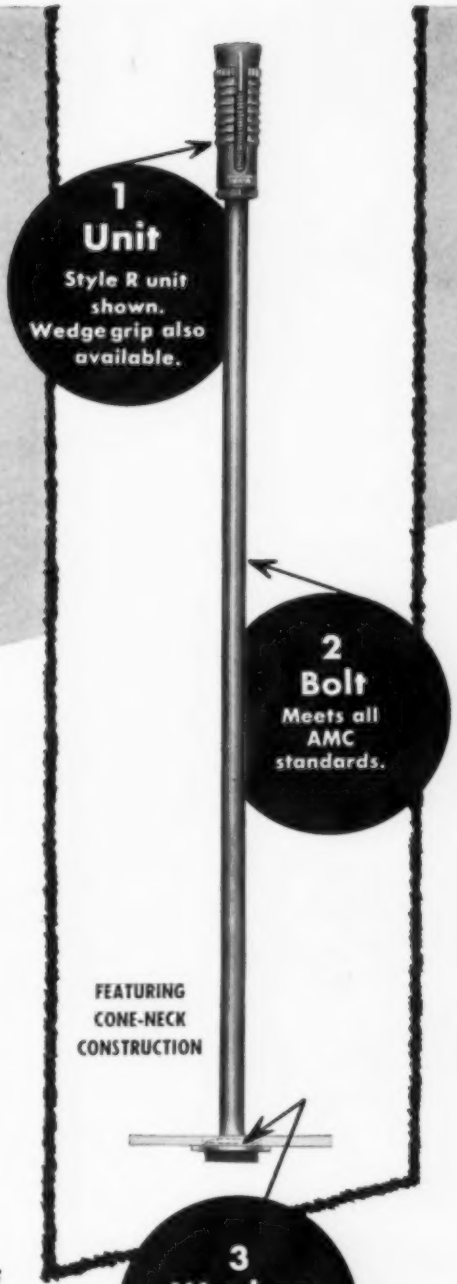


Accessible Service Checks. Outside mounting speeds air cleaner servicing. Inspection port in hood permits ready access to oil dip stick and filler pipe. Lightweight aluminum side sheets are easily removed for engine inspection.

Full Day's Fuel Supply. There's no need to slow down a Payhauler job for refueling. These big haulers pack 125 gallons, enough fuel for a full day's operation on most jobs. Filter-type breather caps and built-in strainers help keep fuel clean and grit-free.

west virginia's

TIME SAVING *new* CONE-NECK BOLT



FACILITATES ON-THE-JOB ASSEMBLY — Washer slips on right over the assembled unit. No more costly on-the-job assembly problems.

GIVES YOU A FASTER, SAFER INSTALLATION — It's quicker — it's easier . . . and thanks to the cone shaped neck of the bolt, the washer fits centrally and closely. It's guaranteed safer.

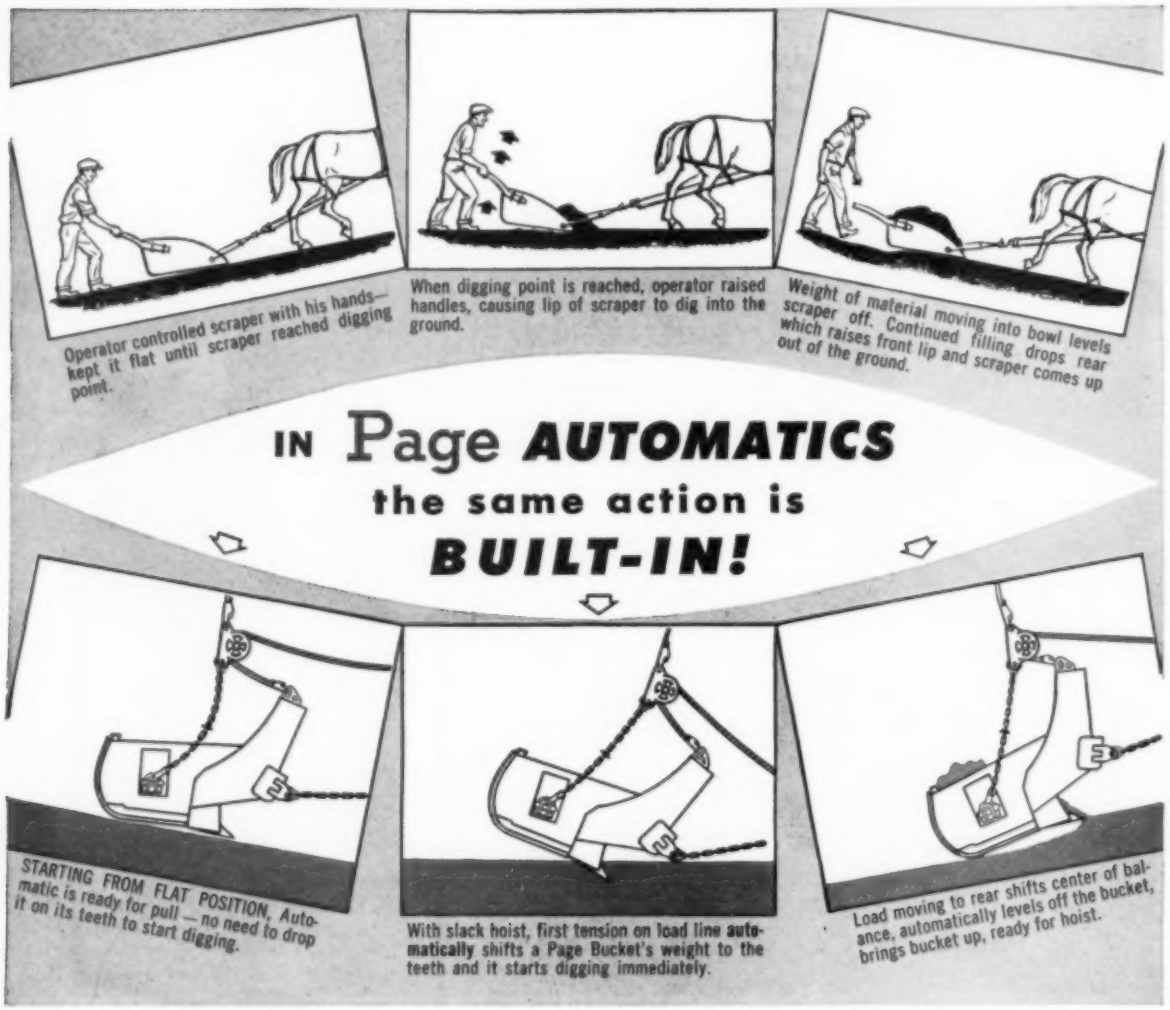
STYLE R AND WEDGEGRIP UNITS AVAILABLE FOR ALL ROOF CONDITIONS

BETTER PRODUCTS FOR BETTER MINING — West Virginia Steel & Mfg. Co. Huntington, W. Va.

west virginia steel and mfg. co.

BOX 316 HUNTINGTON, WEST VIRGINIA

REMEMBER The Old Slip Scraper *"digging action"?*


Operator controlled scraper with his hands—kept it flat until scraper reached digging point.
When digging point is reached, operator raised handles, causing lip of scraper to dig into the ground.
Weight of material moving into bowl levels scraper off. Continued filling drops rear which raises front lip and scraper comes up out of the ground.
IN Page AUTOMATICS the same action is BUILT-IN!
STARTING FROM FLAT POSITION, Automatic is ready for pull — no need to drop it on its teeth to start digging.
With slack hoist, first tension on load line automatically shifts a Page Bucket's weight to the teeth and it starts digging immediately.
Load moving to rear shifts center of balance, automatically levels off the bucket, brings bucket up, ready for hoist.

Page "AUTOMATIC'S" DIGGING ACTION Means More Production

Watch a Page Automatic work — see how it loads full in 1½ to 2 bucket lengths — break out for a fast hoist and you'll see why production-wise owners and operators choose an Automatic every time.

The automatic action built into every Page AUTOMATIC Dragline Bucket gives owners what they want — MORE PRODUCTION PER DAY . . . year in and year out in every kind of digging at any depth. We can prove the superiority of a Page Automatic on your own machine. There's no obligation. *Write for details and Bulletin GPB-554.*

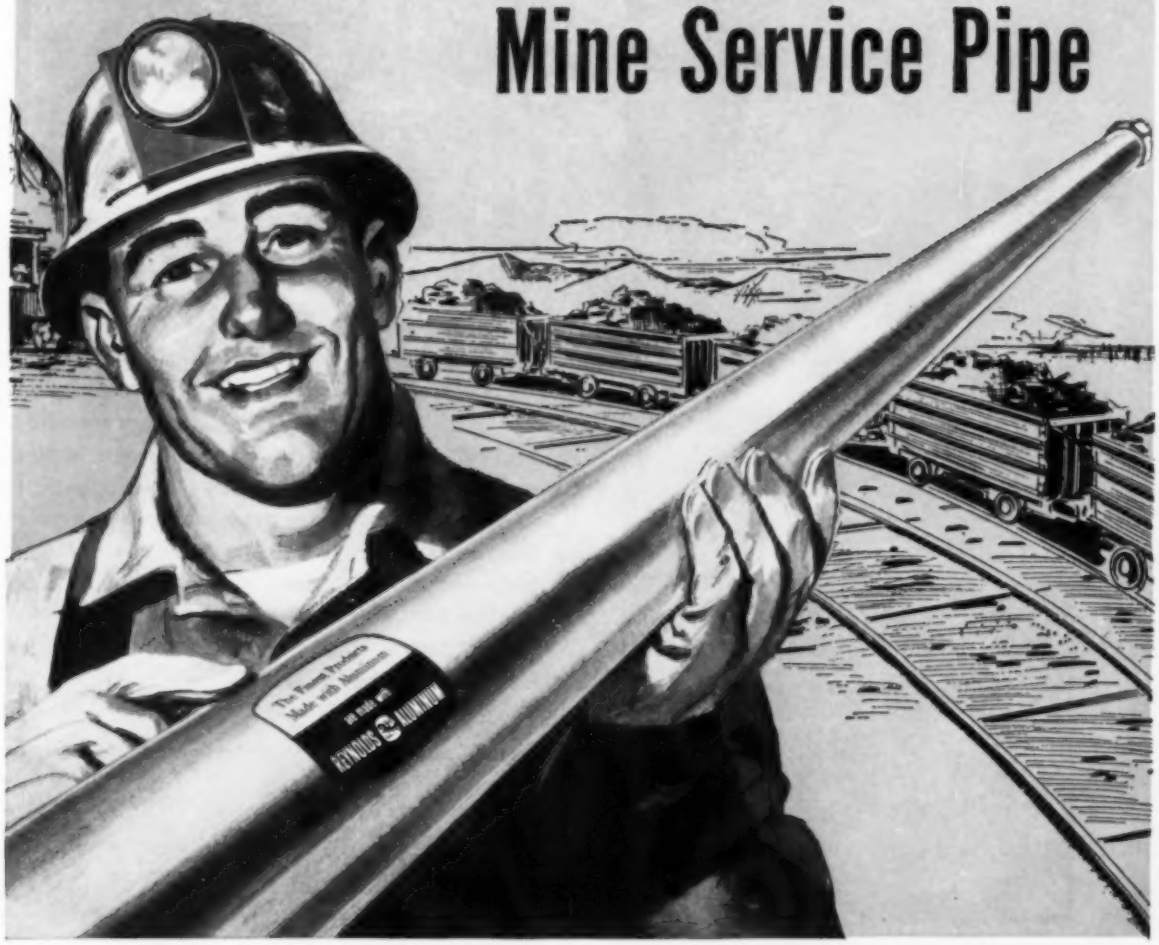
PAGE ENGINEERING COMPANY
CLEARING POST OFFICE • CHICAGO, ILLINOIS

Page
Automatic Dragline Buckets
Walking Draglines

B 3107

If it's a Page... It DIGS

NEW! Reynolds Aluminum Mine Service Pipe



Faster, lower cost installations for Temporary Pipe Lines

Now lightweight, corrosion-resistant Reynolds Aluminum Mine Pipe brings new labor-savings and much longer service life to coal mines. Using quick couplings, one man can quickly join pipe sections. And aluminum pipe and couplings easily accommodate coal mine working pressures for drain pipe, air intake, and water intake lines.

Lightweight lowers installation time. Aluminum saves up to 90 percent of the weight of heavy steel pipe.

Quick Couplers Available. Several manufacturers supply high-grade coupling devices to meet mine layout requirements.

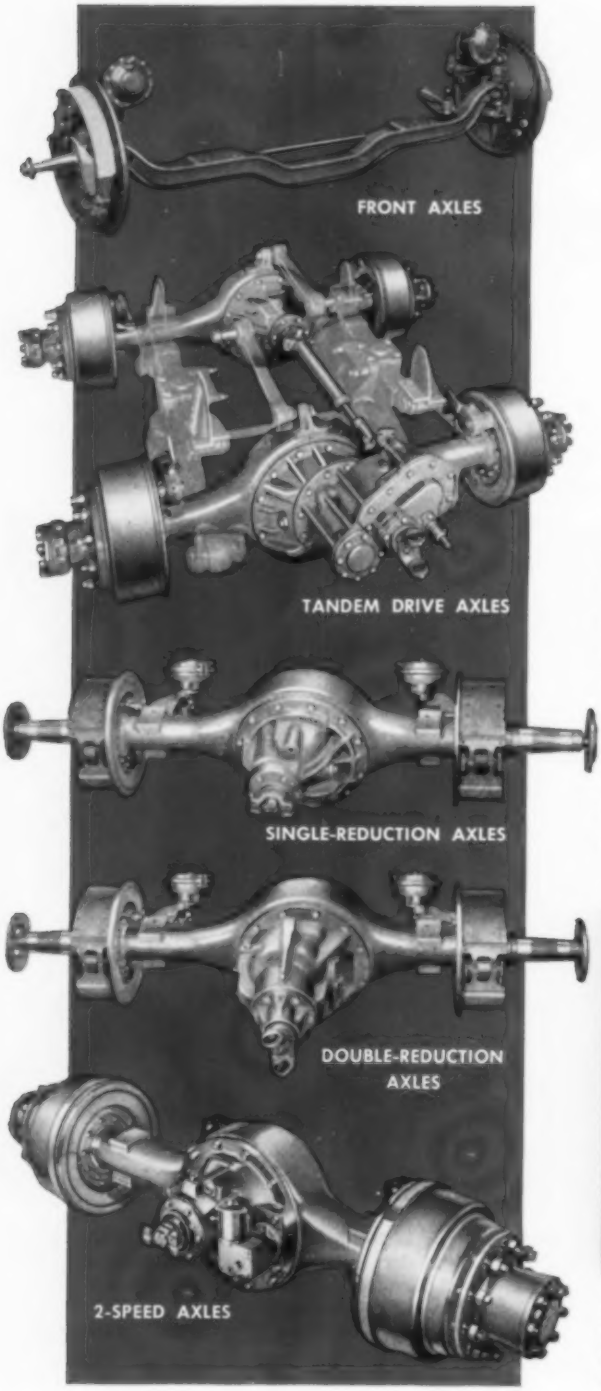
Corrosion Resistance Extends Service Life. In one mine with 3.5% sulphur, aluminum pipe is still in service after two years. Standard steel pipe had and average life of less than 3 months.

For further information about Reynolds Aluminum Mine Service Pipe and availability from nearby distributors, write *Reynolds Metals Company, P.O. Box 1800-NQ, Louisville 1, Kentucky.*

Write for new brochure "Reynolds Aluminum Mine Service Pipe".

The Finest Products Made with Aluminum are made with REYNOLDS ALUMINUM

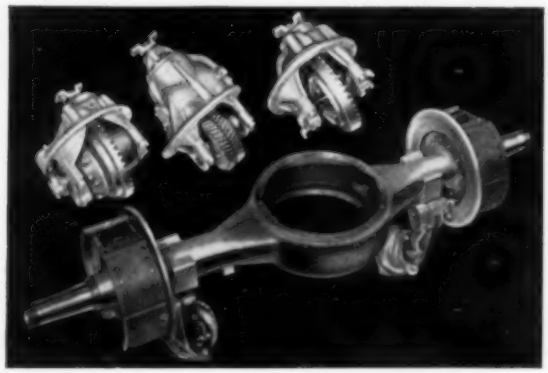
See "FRONTIER", Reynolds exciting dramatic series, Sundays, NBC-TV



EATON AXLES

Outstanding Performance Cuts Hauling Costs, Assures Longer Vehicle Life

Strict adherence to exacting quality standards, the most modern of production procedures, and important design advancements developed through Eaton's years of axle experience, combine to offer the truck operator axles with many worthwhile benefits. Eaton Axles, engineered for rugged stamina, keep trucks on the job, hold down operating and maintenance costs, and deliver more vehicle miles at lower cost per mile.



This rugged housing, used in famous Eaton 2-Speeds, is also used for Eaton single-reduction and double-reduction axles. The three types of heads are interchangeable.

EATON — *AXLE DIVISION*
MANUFACTURING COMPANY
CLEVELAND, OHIO

PRODUCTS: Sodium Cooled, Poppet, and Free Valves • Tappets • Hydraulic Valve Lifters • Valve Seat Inserts • Jet Engine Parts • Rotor Pumps • Motor Truck Axles • Permanent Mold Gray Iron Castings • Heater-Defroster Units • Snap Rings Springtites • Spring Washers • Cold Drawn Steel • Stampings • Leaf and Coil Springs • Dynamatic Drives, Brakes, Dynamometers

What Every Mine Operator Should Know About NEOPRENE

WHAT *is* neoprene anyway? Perhaps you've asked yourself that question when you've heard neoprene mentioned in relation to trailing cable or conveyor belts.

Neoprene is a synthetic rubber made by Du Pont. But Du Pont does not make any finished products from neoprene . . . finished products are made by the same rubber manufacturers who now supply the mining industry with rubber products of all kinds.

Through the compounding skill of these rubber manufacturers, and by the vulcanization process, neoprene is converted from a plastic raw material to a tough, elastic material . . . used to manufacture *top-quality* rubber products having outstanding resistance to most of the influences that cause rapid deterioration in ordinary rubber goods.

PROPERTIES THAT PAY

Neoprene withstands the deteriorating effects of oils and greases that may be present from over-lubrication or spillage. Because of its chemical composition, neoprene discourages growth of molds or mildews, and is highly resistant to weathering and aging . . . in particular, to the effects of oxygen, ozone, dampness, and sunlight.

NEOPRENE BELTS ARE RUGGED

Any belt can be destroyed by carelessness, but in normal mining operations a tough resilient neoprene belt cover is highly resistant to cutting, chipping, and gouging. Repeated tests with off-the-road tires, in quarries and mines, prove neoprene's superior resistance to this type of damage.

WHY NEOPRENE IS IMPORTANT IN COAL MINING

In addition to the characteristics which are essential to a good conveyor belt, neoprene offers an extra property most important in coal mining. It is flame-resistant . . . self-extinguishing . . . and will not spread fire. This is one of the reasons why neoprene is used as a jacketing material on trailing cable . . . why neoprene-covered conveyor belts offer extra safety in underground operations.

You will find neoprene belts are a profitable investment. They actually earn their way through increased production because of less downtime, lowered maintenance costs and added safety. The next time you buy belting, we suggest you consider neoprene. Ask your rubber-goods supplier for full details on the neoprene products he sells.

E. I. du Pont de Nemours & Co. (Inc.), Elastomers Division, Wilmington 98, Delaware

DU PONT
REG. U.S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

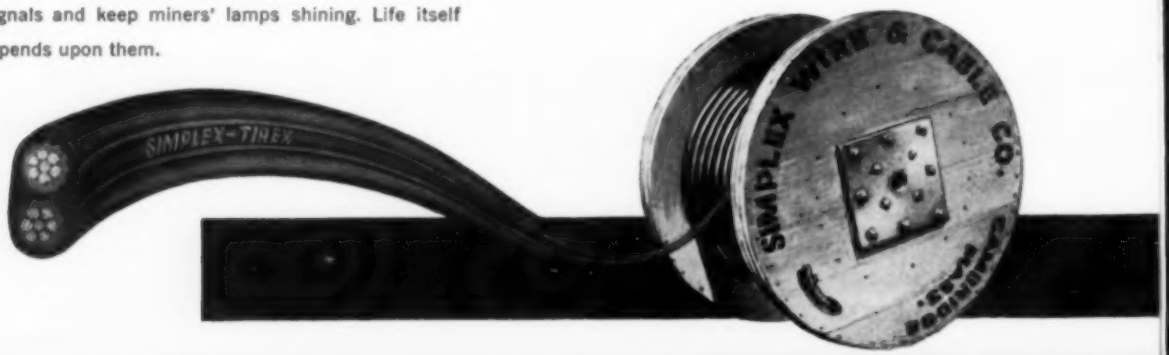
Putting electricity where it's needed:

Wherever man's energy is being spent in industry, man must use the power of electricity. Mining men demand that this power be delivered efficiently and SAFELY.

This insistence on top quality and top performance explains the tremendous popularity of Simplex-TIREX cords and cables. You see them in and around mines everywhere, performing dependably in a variety of applications. These cords and cables pour energy into drills, loaders, cutters, feeders, shuttle cars and locomotives. They transmit track signals and keep miners' lamps shining. Life itself often depends upon them.

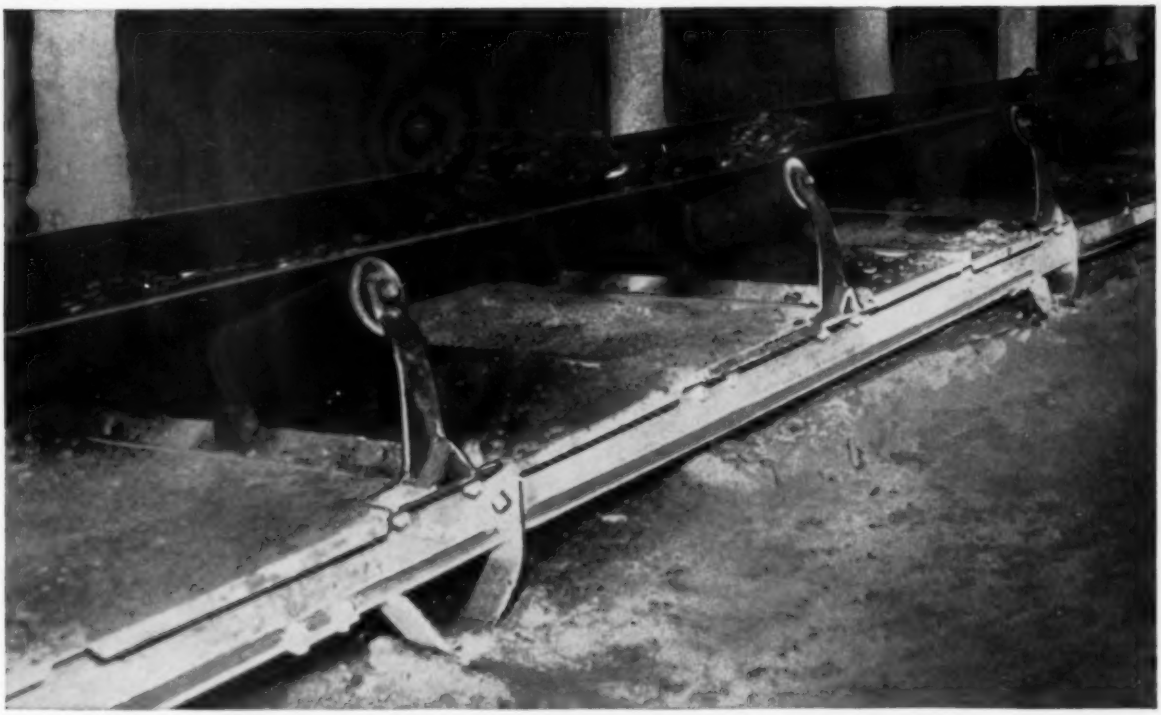
Simplex-TIREX performs ruggedly,—even under the most trying conditions. Featuring CURED-IN-LEAD SELENIUM NEOPRENE ARMOR, they are engineered to resist abrasion, oil, flame and water.

Simplex-TIREX bears the molded markings of BM and P-101 on its jackets and is made in a wide range of sizes. Be sure to specify Simplex-TIREX when you order cords and cables. **SIMPLEX WIRE & CABLE CO.,** 79 Sidney St., Cambridge 39, Massachusetts.



PYROPRENE* BELTING
GIVES YOU
LOWEST COST PER TON
PLUS FIRE RESISTANT* PROTECTION

FIRE RESISTANT*
OIL RESISTANT
MILDEW PROOF



Tell us your conveyor problems! We welcome the opportunity of proving that Hamilton PYROPRENE* will lower your costs and provide fire resistant* protection.

Write, wire or phone for more details of Hamilton service. Ask for a copy of our 1956 catalog.

*Acceptance designation: "FIRE RESISTANT, U.S.B.M. No. 28-7" Jan 27, 1956

OVER 86 YEARS OF SERVICE TO INDUSTRY

OVER 86 YEARS OF SERVICE TO INDUSTRY

HAMILTON RUBBER MANUFACTURING CORPORATION

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Branches in

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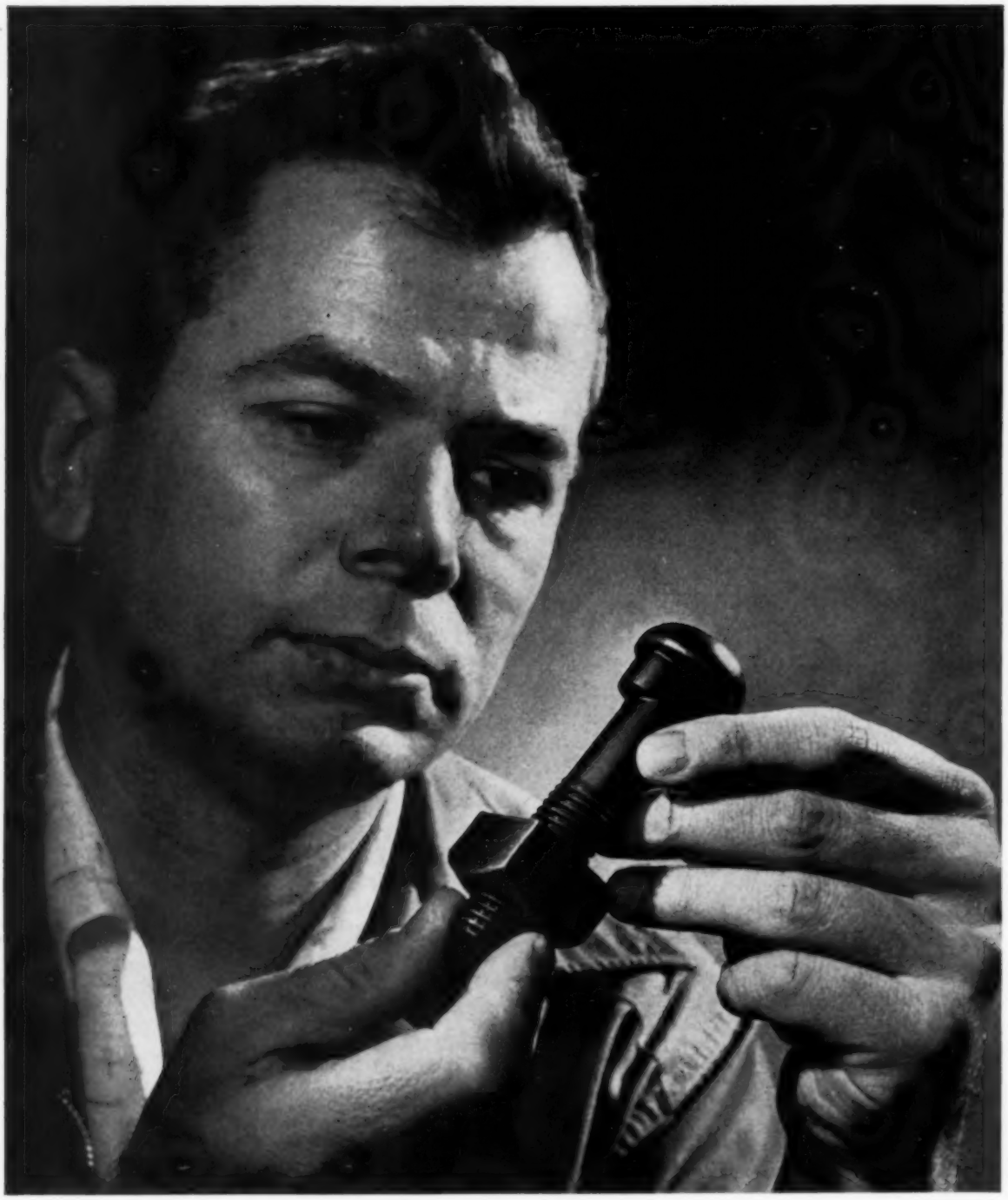
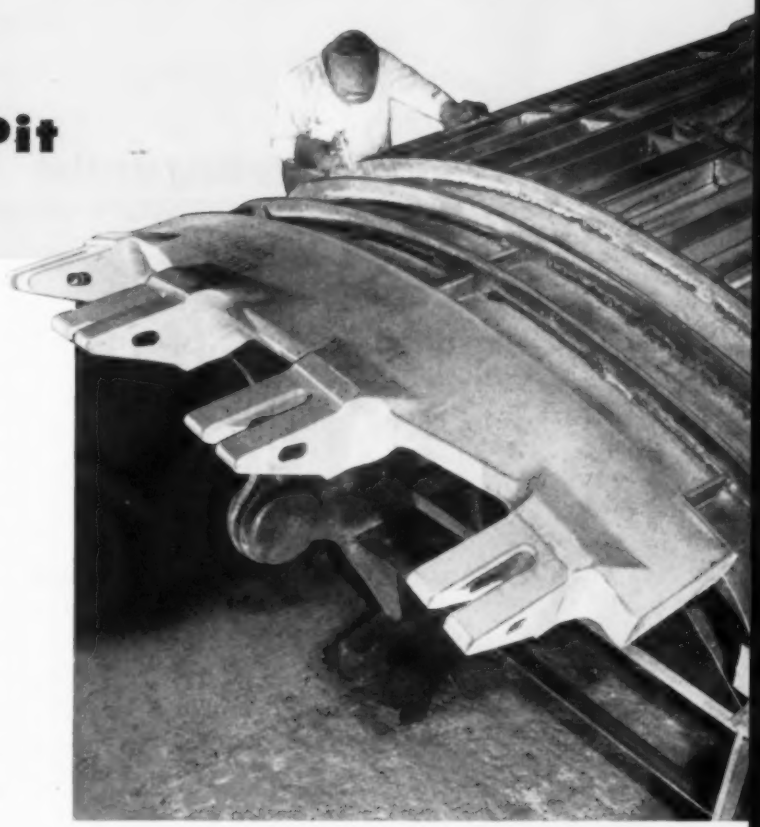


"We've used Bethlehem Track Bolts for years. They've got strong heads and necks, and sharp rolled threads. We can count on them for good performance."

Spikes and machine bolts, too!

BETHLEHEM STEEL

How BUCYRUS-ERIE'S Close Attention to Quality Pays Off in Your Pit



Close attention—during manufacture—to the little things that mean outstanding quality . . . that's the basis for the fine performance you get in removing overburden with a Bucyrus-Erie stripping shovel. Take the steels Bucyrus-Erie strippers are made of, for example. To the naked eye there is very little difference, in comparison with other machines. But a microscopic examination of vital parts would show the many important *little* differences that together make such a *big* difference in performance on the job.

At Bucyrus-Erie, hammer forging, annealing, heat treating, case hardening, and flame hardening — each process is applied where it contributes most to strength, toughness, and hardness. The most modern arc welding is used, plus stress relieving by heat treating, where this will contribute greater strength and longer life.

See a modern Bucyrus-Erie stripper in action. You'll soon know why owners agree that you get more for your money with a Bucyrus-Erie, and back that statement with their repeat orders.

92L56C

Bucyrus-Erie stripping dippers are a combination of castings and structural steel welded together. At Bucyrus-Erie, welding of structural components for excavators was first done about thirty years ago.

This 1050-B shovel, equipped with 45-yd. dipper, is stripping overburden in an Ohio coal mine. For large-scale excavating, Bucyrus-Erie builds excavators up to 65-cu. yd. capacity.

BUCYRUS ERIE

South Milwaukee, Wisconsin

Wire rope lasts as long as the wire it's made of!

ROEBLING'S NEW ROPE WIRE

1105

HAS THE CAPACITY TO ENDURE...
AND

Royal Blue

WIRE ROPE
IS MADE OF 1105!

Write us for full facts on the all-steel Royal Blue Wire Rope, or contact your Roebling distributor

JOHN A. ROEBLING'S SONS CORPORATION, TRENTON 2, N. J. BRANCHES: ATLANTA, 934 AVON AVE. • BOSTON, 51 SLEEPER ST. • CHICAGO, 5525 W. ROOSEVELT RD. • CINCINNATI, 3253 FREDONIA AVE. • CLEVELAND, 13235 LAKEWOOD HEIGHTS BLVD. • DENVER, 4501 JACKSON ST. • DETROIT, 915 FISHER BLDG. • HOUSTON, 6216 NAVIGATION BLVD. • LOS ANGELES, 5340 E. HARBOR ST. • NEW YORK, 19 RECTOR ST. • ODESSA, TEXAS, 1935 E. 2ND ST. • PHILADELPHIA, 230 VINE ST. • SAN FRANCISCO, 1740 17TH ST. • SEATTLE, 900 1ST AVE. S. • TULSA, 321 N. CHEYENNE ST. • EXPORT SALES OFFICE, 19 RECTOR ST., NEW YORK 6, N. Y.

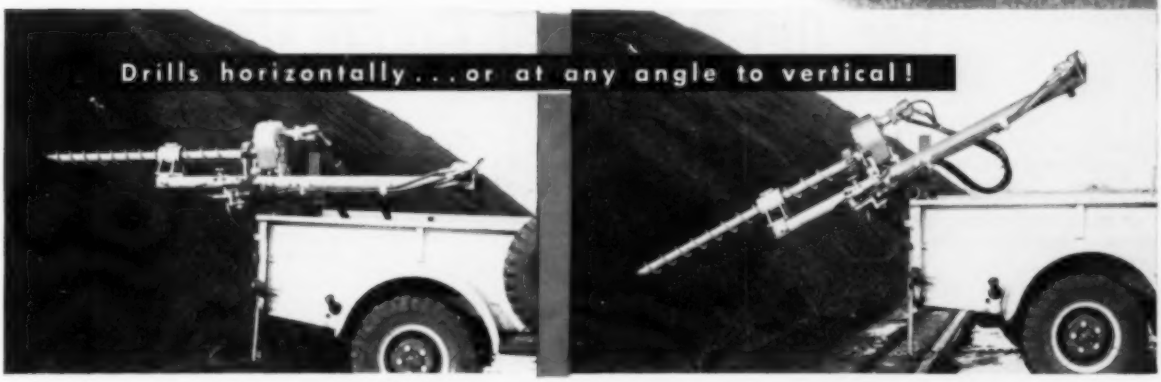
CARDOX *Announces*

NEW TRUCK-MOUNTABLE* GENERAL PURPOSE drill

- **Hydraulic-powered**
- **Hydraulic-controlled**
- **Auger sizes from 3 to 12 in.**
- **Drills vertically, horizontally or at any angle in between**

Mobility pays off when power, speed and rugged construction are not sacrificed. The CARDOX general purpose drill gives you these features and more. It adds control such as is seldom found outside machine shops. Can drill at any fore-and-aft or lateral angle from horizontal to vertical with equal power and speed.

*Mounts on any flat-bed truck, crawler or farm-type tractor, or any other mobile equipment with a power take-off to drive its hydraulic system. NOTE: *Can also be dismounted for use as a trench drill or horizontal drilling on different levels.* Maximum feed rate: 20 fpm. Write for complete details.



CARDOX CORPORATION • **BELL BUILDING** • **CHICAGO 1, ILLINOIS**

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Route 2, Box 99
Phone: Robinson Creek 5

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Phone: Boulder
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Phone: Library Colonial 3-6910

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Phone:
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Evansville, Indiana
307 Northwest Fifth St.
Phone: Evansville 2-8944

Ottumwa, Iowa
Phone: Ottumwa
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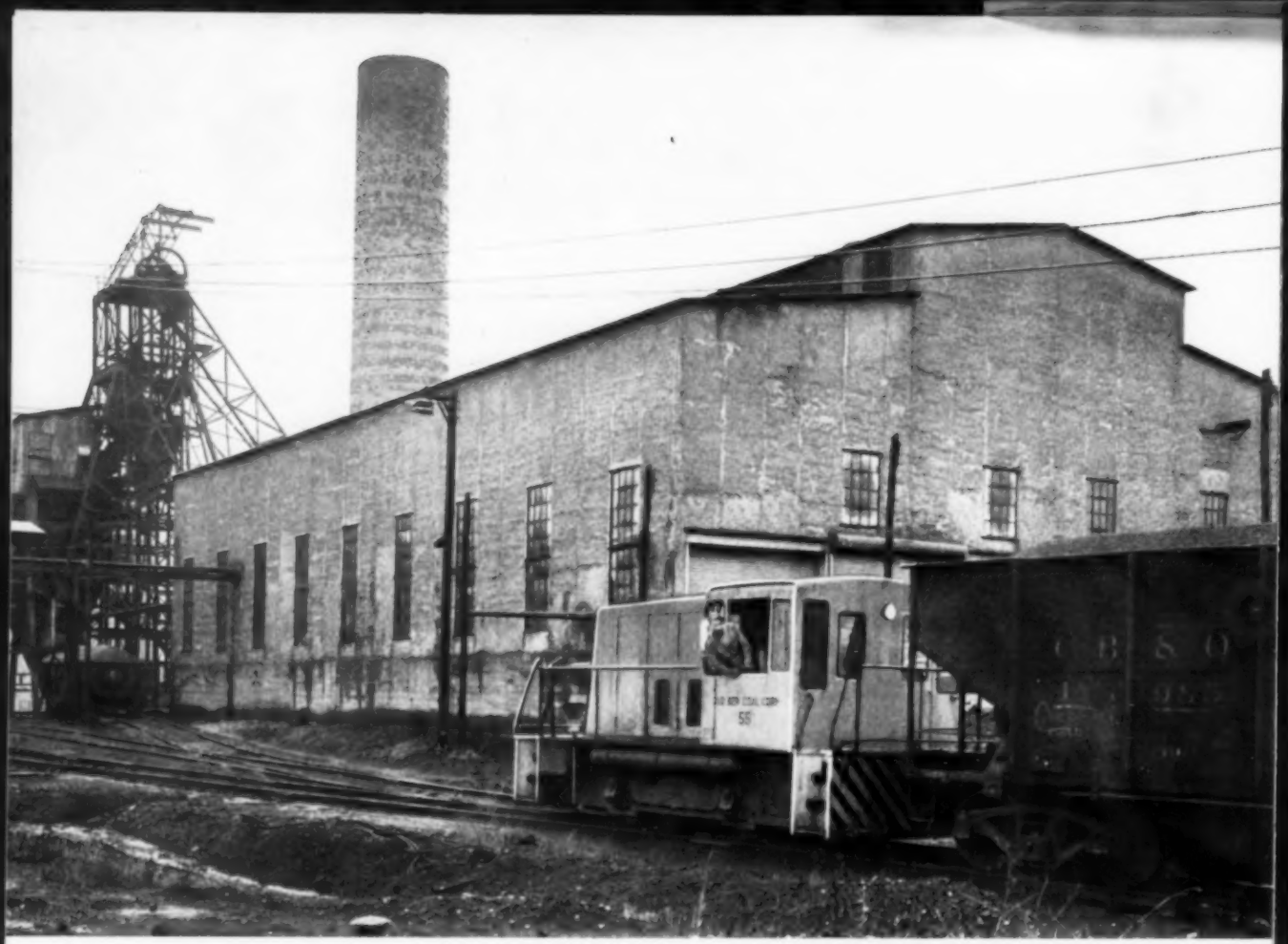


G-E 35-ton Diesel-electric Locomotive Shuttles Million Gross-ton Miles a Year For Old Ben Coal Corporation

Push and pull . . . stop and go . . . shunt, shuttle and haul . . . over one million gross-ton miles a year!

Twenty hours a day a 35-ton G-E diesel-electric locomotive is working under these conditions for the Old Ben Coal Corporation at its West Frankfort, Illinois, mine. It handles everything from shunting and classifying empties, to humping fully loaded gondolas of processed coal to the load yard for pick-up by main line locomotives.

100% available during working hours, this locomotive is ready to go on a moment's notice. A push of the starter button and the job is under way. The 275 horsepower built into this powerful locomotive makes regular movement of 350-ton train loads a simple and routine matter. And, 1.5% grades are no chore because this diesel-electric has smooth, ready power.

Built with long life in mind, G-E diesel-electrics are designed specifically for industrial service. Simple, rugged electric drive with few wearing parts cuts maintenance costs. Dependability has been tested and proved in more than 2300 applications in every major industry.

YOUR PARTICULAR HAULAGE NEEDS CAN BE FILLED with one of the seven standard locomotive sizes, ranging from 25 to 95 tons.

For a survey of your locomotive requirements, without obligation, contact your local G-E Apparatus Sales Representative. General Electric Co., Locomotive & Car Equipment Dept., Erie, Pa.

120-82

You Get
Longer Life,
Better Performance,
Lower Cost
WITH ELECTRIC DRIVE!

GENERAL ELECTRIC

STRIP MINERS GET BETTER PERFORMANCE, LONGER LIFE AT THESE 3 VITAL ZONES . . .

Genet and Huffstutler, strip miners, Beech Creek, Kentucky, no longer worry about the three most common wire rope problems — scored drums, corrugated sheaves and short-lived wire rope. Their dragline is now equipped with Yellow Strand Flattened Strand Wire Rope!

Yellow Strand Flattened Strand whips these problems because it's made of strands laid up in a triangular form (see illustration at right).

The outer contact surface is smoother to conform to the sheaves. You get 10% greater metallic area, a corresponding increase in strength, plus a compactness unobtainable in round strand construction. The greater contact area of Yellow Strand Flattened Strand means you get smoother running through sheaves, smoother spooling over drums. And because of its construction, Yellow Strand lasts longer—up to twice as long in many cases. So order Yellow Strand Flattened Strand from your Distributor the next time you stop in to see him.

COMPARE *Yellow Strand* FLATTENED STRAND

with ordinary wire rope (right). In Flattened Strand you have twelve contact points, greater contact area, smoother surface, less wear. Result: longer service, lower final cost!

Yellow Strand®

Manufacturers of Wire Rope for 80 Years

Broderick & Bascom Rope Co.

4203 Union Blvd., St. Louis 15, Mo.

American Logging Tool Corporation is a subsidiary of Broderick & Bascom Rope Co.

STAYS ON THE JOB LONGER

Rugged body and frame withstand the impacts of loading, hauling and dumping heavy excavation in construction, mine and quarry service.

SPEED AND STABILITY

The 5-speed transmission and Euclid planetary axle provide top speeds with full payload up to 27 m.p.h. Free-floating Euclid spring suspension gives maximum stability empty or loaded under all road conditions . . . permits faster safe travel speeds.

18-ton payload with 16.00 x 25 tires

Outstanding

FEATURES

- **30,000 lb. payload with 14.00 x 24 tires**
- **10½ yd. body**
- **218 h.p.**
- **hydraulic booster steering**
- **air assist clutch**

Here's the New R-15 "Euc"

that sets a new high in 15-ton Rear-Dump Performance!

For over 20 years 15-ton Rear-Dump "Eucs" have paced the field in mine, quarry and construction work. They've delivered "plus" performance year in and year out on hundreds of the toughest jobs.

This Model R-15 incorporates the engineering advances, easy operation and maintenance features resulting from unequalled field experience with other Euclids of the same capacity. Dependable work-ability means more payloads per day at lowest cost per ton or yard moved.

Have your Euclid dealer give you the full details on this new 15-ton Rear-Dump and the complete line of Euclid earth moving equipment. He'll be glad to show you why so many users have proved for themselves that ***Euclids are your best investment.***

EUCLID DIVISION, General Motors, Cleveland 17, Ohio

Euclid Equipment

FOR MOVING EARTH, ROCK, COAL AND ORE

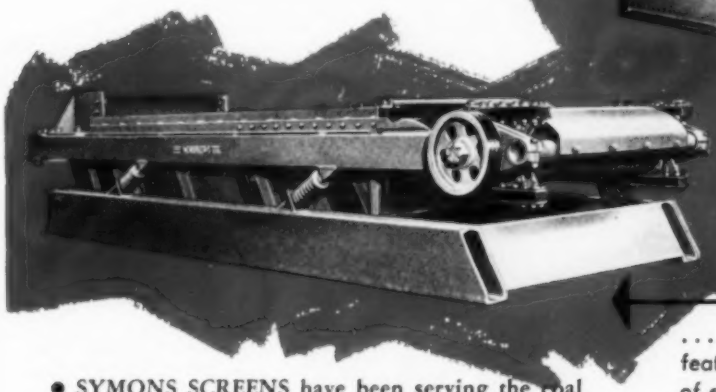
Specify

SYMONS SCREENS . . .

for LOW COST
MORE EFFICIENT
Coal Preparation Service

SYMONS V-SCREENS

. . . the *only* vibrating screen that does not depend upon gravity alone to size or dewater. *By combining centrifugal force with gravity, the V-Screen does a better screening job — makes sharper separations — gives you a much dryer product with less degradation than other dewatering methods . . . and requires only 5 H.P. to operate under full load.*



SYMONS HORIZONTAL VIBRATING SCREENS

. . . in a wide range of sizes and types, all featuring: *less breakage and degradation of even the more friable coals — greater uniformity in graded sizes — wide range of separations — simple, low cost installation — low maintenance cost — easily enclosed, with entire drive mechanism outside of housing.*

• SYMONS SCREENS have been serving the coal industry for almost twenty years, in hundreds of screening applications throughout the world. These quality screens have gained an enviable reputation for dependability, efficiency and economy . . . backed by the same high standards of accuracy, design and workmanship that are used in the manufacture of *all* Nordberg Machinery.

SYMONS . . . *A REGISTERED NORDBERG TRADEMARK KNOWN THROUGHOUT THE WORLD*

NORDBERG

MACHINERY FOR PROCESSING ORES and INDUSTRIAL MINERALS
NEW YORK • SAN FRANCISCO • DULUTH • WASHINGTON
TORONTO • MEXICO, D.F. • LONDON • JOHANNESBURG

CA

NORDBERG MFG. CO., Milwaukee, Wisconsin
Please send me further information on the following screens

☐ Symons V Screens ☐ Symons Rod Deck Screens
☐ Symons Horizontal Screens ☐ Symons Grizzlies

Name _____ Title _____
Company _____
Address _____
City _____ Zone _____ State _____

© 1955, Nordberg Mfg. Co.

$255

(PLEASE GIVE THIS ADVERTISEMENT TO YOUR BLASTING FOREMAN)

Stray Currents from THUNDERSTORMS don't worry me now

I'm using Primacord

"You understand . . . I don't *like* thunderstorms. No blaster does. But ever since that job in Kentucky when a direct hit failed to detonate Primacord, I make it a point to use this detonating fuse during the thunderstorm season."

Here's the reason. Primacord is an insensitive detonating fuse. It is not affected by stray electrical currents. It cannot be set off by friction, sparks or ordinary shock. It must be detonated with a blasting cap.

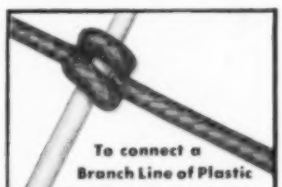
Primacord is used to detonate the entire load in each hole, and to connect all holes in planned sequence to produce *good digging*. A detonating cap is attached to the Primacord only after everything is ready . . . when men and machines are out of the danger zone.

Use Primacord wherever there is danger of stray electrical currents — and particularly during thunderstorm seasons.

For more information see your Explosives Supplier, or write to

THE ENSIGN-BICKFORD COMPANY
Simsbury, Connecticut

Primacord — Quarrycord — Ignitacord® Safety Fuse — Blasting Accessories
Established 1836



To connect a Branch Line of Plastic Reinforced or Plastic Wire Countered Primacord with the Trunk Line

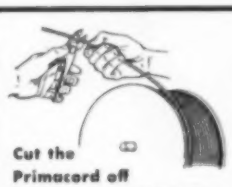
use this DOUBLE HITCH in the textile-covered Primacord Trunk Line. *Draw it up as tight as you can, and make sure that the Branch Line leads off at a RIGHT ANGLE to the Trunk Line.*

PRIMACORD®

DETONATING FUSE

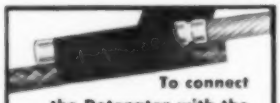
PROVED AND APPROVED

P-21



Cut the Primacord off the Spool Immediately

Make this a safety habit! As soon as you have taken off the length of Primacord you need for a down-hole or for a trunk-line, *cut it off the spool! Don't waste a second — do it now!*



To connect the Detonator with the Primacord Trunk Line

use FRICTION TAPE. You can detonate Primacord with fuse and cap or electric blasting cap. Lay the cap alongside of the Primacord with the business end of the cap pointing in the direction that the Primacord will detonate. Tape the two snugly together, so that you have a tight connection.

To connect a Branch Line with the Trunk Line

Use this HALF HITCH for Plain and Reinforced Primacord. *Draw it up as tight as you can, and be sure the Branch Line leads off at a RIGHT ANGLE to the Trunk Line.*

To lengthen a Trunk Line

of Plain or Reinforced Primacord, tie a SQUARE KNOT. *Draw it up as tight as you can* — it won't slip back. Caution: don't use any knot in a hole — it might break or hang up explosives when loading.

Devoted to the Operating, Technical and Business Problems of the Coal-Mining Industry

Coal Age

JUNE, 1956

IVAN A. GIVEN, EDITOR

No Doubt

THE MAN WHO would venture to express a doubt as to the lasting qualities of the present high level of economic activity in the United States possibly runs the risk of being compared to he who introduced the serpent into the garden of Eden. Your editor is not going to be that man, since he, too, believes with the majority that things will continue good—in spite of the difficulties presently being experienced by the farmers, and the reduced operating rate —compared to the all-time peak of 1955—of the automobile industry. But it is well to mark such deviations from the general pattern and consider them well, if only to make sure that there is solid reason for continuing to feel that the economic express will remain on the rails.

One bit of evidence supporting that conclusion is that it apparently is not as easy to derail the express these days, witness the events of 1954, when the low state of steel and general manufacturing gave the coal-mining industry quite a few bad months. The economy passed that crisis without too much strain, which leads to the conclusion that it can surmount the farm and auto letdowns of 1956. Aside from that, the economy's most powerful single prop—capital spending—is scheduled for a sharp boost in 1956, according to the recently completed survey "Business' Plans for New Plants and Equipment—1956-1959," conducted by the McGraw-Hill Dept. of Economics. A one-sentence summary of the findings is as follows: "U. S. business now plans to spend almost $39 billion for new plants and equipment in 1956, a 30% increase in spending over 1955." Furthermore, the survey "shows a very high level of expenditures already planned for 1957, 1958 and 1959. For the first time since these surveys were started, plans for two years in advance—i.e., for 1957—are equal to those in the current year (1956). Plans have increased in almost every industry since the preliminary survey last October."

Aside from capital expenditures, the McGraw-Hill economists have this to say about the business outlook: "Businessmen are counting not only on good business this year, but in 1957 and for several years beyond. And this confidence must be considered a major source of strength in the near-term outlook."

All this is good news for coal, since it means that the market opportunity is there and will remain there and expand for the indefinite future. When this is the situation, it becomes much easier to surmount any other industry problems.

Not Good

THE STATISTICAL SERVICE rendered by the U. S. Bureau of Mines over many years has been one of its outstanding activities. It has been featured by flexibility, reliability and all the speed possible with accuracy. For that reason, the recent move to rearrange and decentralize the gathering and compilation of production, accident and other statistics merits only one judgment: "Not good." Tinkering with the statistical service already has slowed up its operations, and parceling it out among the various bureau offices can have only one result: "Still slower." Not only that, the cost will increase substantially because of the duplication of operations and personnel inherent in splitting up a service such as this. One trusts that it is not too late for reconsideration. Coal needs accurate statistics now more than ever, and it needs them faster. That is the best argument for sticking to the system that has proved it can produce—at minimum cost.

Editor, Coal Age Huntington, W. Va.

"To maintain and further develop the foreign market for American coals, we must keep our coals competitive with other fuels at points of consumption, planned high-speed, unloading facilities at our Tidewater dumping piers plus favorable charter rates through the availability of modern, large tonnage, high-speed bulk ships, and improved unloading and handling facilities at foreign ports can all contribute much to the attainment of this basic and necessary objective. An expanded foreign market will assist materially toward a more stabilized price for both foreign and domestic consumption. Tonnagewise, our foreign market exceeds 7% of our total U. S. production; it consumes more tonnage than our American railroads, and is equal to 50% of that marketed through American retail merchants. A market of such importance cannot help but have a favorable influence on prices in all markets. Without this foreign outlet, many modern, highly efficient mines would have difficulty, even in today's expanding market opportunities, in realizing the full advantages of their substantial investment in equipment and sizing and preparation plants: running time for many would be sporadic; overhead costs would be increased; and the present high earnings of our labor as well as the prosperity of our communities would be lessened. The net result would be higher prices in all markets—foreign and domestic. Furthermore, the coal tonnage now moving for foreign consumption represents to our railroads an important source of revenue and in addition to supplying the impetus for new cars, added locomotive power, and other improved facilities with benefit to all, should assist us in achieving lower freight rates on coal for our domestic markets."

R. E. Salvati, president
Island Creek Coal Co.

Bold Action Needed Now in . . .

Editor, Coal Age Pittsburgh, Pa.

"Coal has been such a tremendous factor in the fabulous industrial growth of America that it is but natural that American coal should take an equal importance in export trade to the far corners of the world as those countries receiving American coal expand their industrial frontiers.

"American consumers are benefiting immeasurably from the high production quality of preparation and low cost of coal consumed at home. It is only natural that the overseas markets should look to America as a source of coal which is loaded into the railroad car or onto barges at a cost competitive with coal produced anywhere in the world.

"The problem of transporting coal from mines to points where it can be loaded for overseas or barge trans-shipment is a serious one from a cost and adequate car supply viewpoint. That problem, together with adequate shipping and a reasonable transport cost as well as cost of delivery into the hands of consumers from overseas discharge points, must be met if the American coal industry is to retain and expand this important overseas market."

L. C. Campbell, president
National Coal Association

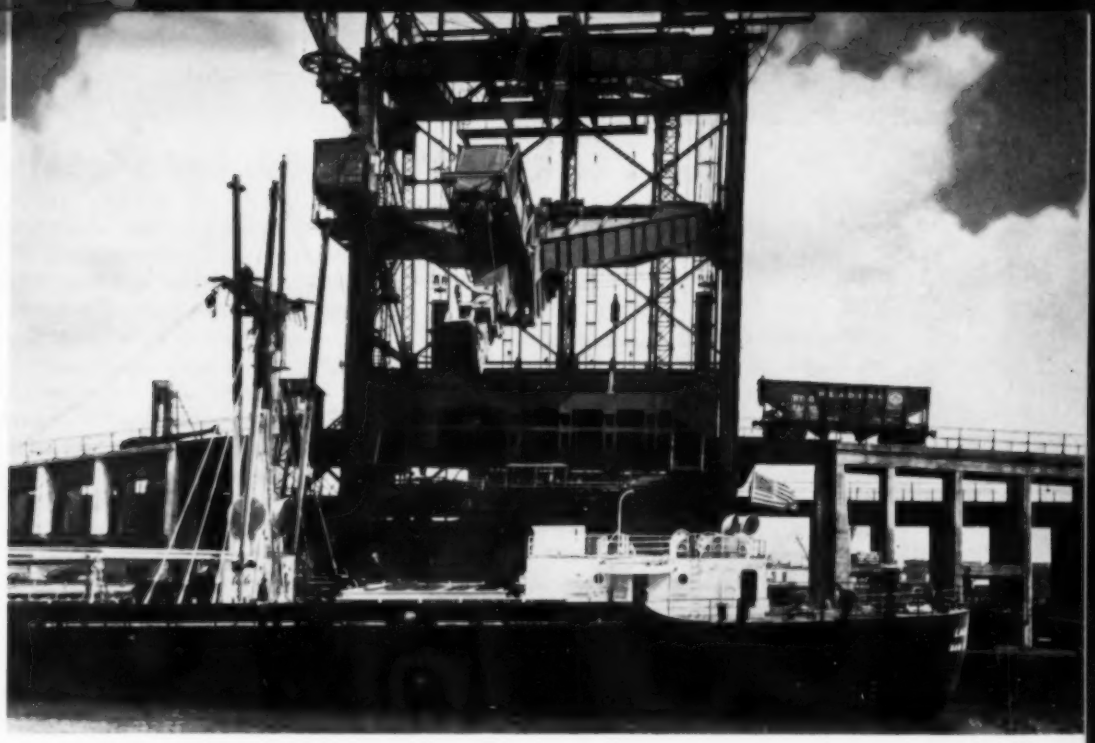
Editor, Coal Age Roanoke, Va.

"I think the most important thing that can be done to hold and develop the overseas coal market is some move to reduce and stabilize the overseas vessel rate. This vessel rate varies appreciably from time to time, and whenever the foreign coal demand increases the vessel rate jumps up a matter of several dollars.

"Recently the presidents of the Pocahontas railways have been meeting with the presidents of important exporting coal companies and the president of the United Mine Workers, endeavoring to work out some solution so as to stabilize the vessel rate for overseas shipment.

"The European and South American countries and Japan are badly in need of high grade coals to meet their increased industrial activities. The United States has these coals in surplus quantities and can well supply them. Due to normal competition in this country, the prices of these coals are well in line, as also is the cost of hauling them from the coal fields to tidewater and discharging them into vessels. If the vessel rate can likewise be kept within reasonable bounds, it will have a tremendous stabilizing effect in holding and increasing the overseas shipment of coal."

R. H. Smith, president
Norfolk & Western Ry. Co.



Planning For Firm Export

Only one force can solidify high-level export: action by the coal industry itself to organize the machinery that will assure overseas customers quality coal at the lowest possible price.

OVERSEAS SHIPMENTS OF COAL, based on the first 4 mo of 1956, are running at about a 40-million ton annual clip, as predicted in the *Coal Age* March feature, "U. S. Coal Props World Prosperity." But permanent sales at this or at a higher level cannot be taken for granted. The coal industry needs an "insurance policy" to wrap around its new, bulging market.

The need is based on growing indications of shortages in cargo space, high ocean freight and insurance costs, inadequate loading and unloading facilities both here and abroad, and cumbersome marketing procedures. An "insurance policy," implemented with appropriate actions, would protect the coal industry from major export losses that could result from these potential, if not actual, troubles.

Customer resistance overseas, though not widespread, has already shown some signs of stiffening. Last month, for example, a reliable source reported that eight cargoes of American coal were turned down by Italy and four by Germany. In each case, the overseas buyer indicated that he wanted to wait and see if he could get a better delivered price at some later date.

If not aggressively combatted, customer resistance could snowball with these results:

1. Southern producers, who now export about 90% of American coal, would be left without a market for up to possibly one-third of their tonnage.

2. Distress coal, possibly as much as 35 to 40 million tons, would hit the domestic market with an inevitable depression of domestic prices and profits.

EXPORT CONCEPT MUST CHANGE

For too long the export market has been looked upon as a sideline—as something apart from the industry's total merchandising effort. This sideline approach has evolved, of course, from the record. Over the years exports have either shot up or fallen sharply and the ups have been due to extraordinary demands of an abnormal world situation, usually a war or postwar recovery. But now, all evidence points toward a normal export market based on steady world growth in energy demands, population and industry and on the inability of other world sources to meet the coal needs for such growth. Even Poland, the biggest exporter outside the U. S., entered the market in April for 130,000 tons of American coking coal.

Export Leaders Want Stabilized Freight Rates,

Cleveland, Ohio

Editor,
Coal Age

"The chief factors to be considered to insure the continuation of our export coal business, and to sustain the present high level, would be first, to stabilize in some way ocean vessel rates, and secondly to encourage improvement in dock and handling facilities at European ports.

"As the export business is now conducted, vessel rates fluctuate almost in proportion to the demand for export coal, based on 'what the traffic will bear.' These fluctuations are so wide that the price of coal at the mine, and the rail freight rates to the port are subordinated in the laid down cost of the coal in foreign ports. Although long term commitments on a firm basis can be obtained for coal in this country, it is not sufficiently possible to obtain the same long term commitments at reasonable costs on ocean going rates; hence buyers and importers overseas are reluctant to contract requirements on a long term basis.

"Although foreign purchasers appreciate the superior quality of American coals, and frequently continue to take such coals even at a higher cost than the European product, when ocean rates reach a level where the laid down cost of the coal is unreasonable, the market shifts and, as in the past, the American export market is jeopardized.

"The second point of consideration is that many European ports are not adapted for handling coal cargoes. Coal is unloaded at such ports from a vessel to a lighter, thence to a river barge from which it must be placed on a dock. This extra handling tends to break the coal and reduces the importer's realization from the cargo.

"To summarize, if ocean vessels could be built primarily to handle coal at reasonable rates, and at speeds which would reduce the present sailing time between Europe and America, and if European port and handling facilities were such as to minimize high costs and severe degradation of coal, we would be well on the way to enjoying a high level of exports for many years to come."

Walter J. Tuohy, president
The Chesapeake & Ohio Ry. Co.

New York, N. Y.

Editor,
Coal Age

"Following the great increase in exports of American bituminous coal in 1955, particularly the last six months when the overseas and South American shipments amounted to roughly 34 million tons, as American producers we had to make a careful study and appraisal of this new and developing market. In the 35 years we have been shipping coal abroad, this increase in business was quite different from anything we had ever found heretofore.

From reliable, first-hand sources in overseas countries, the *Coal Age* March feature established the firmness and size of the export market for at least the next 5 yr—insofar as the firmness of any market can be established. That firmness depends only on continued world prosperity and the market-preserving ingenuity of U. S. producers.

Only one force can convert the "probably firm" export market to "certainly firm." And that is the concentrated, farsighted efforts of the coal industry itself to plan and organize the machinery that will enable the delivery of quality coal to overseas customers at the lowest possible price.

The coal industry as a whole must recognize the export opportunity and adjust realistically to it. The experience during the last 15 yr of drastic losses in the railroad and retail markets should be fresh enough in management minds to jar complacency and engender more farsighted merchandising effort. Let's not wait until export problems have assumed major proportions—then it will be too late.

To insure the permanency of the overseas market, we must avoid the philosophy expressed by one coal executive: "I am pretty big in this game, but I have to admit that we fly by the seat of the pants and almost on a daily change of policy."

Instead, coal needs more of the imaginative thinking expressed by one of the Nation's top experts on energy: "I believe the business of export of coal can be put on a totally different foundation and basis from what it has been heretofore. There is a great opportunity to make this a continuing and prosperous enterprise for many decades to come. But, new attitudes and approaches will be essential if these prospects are to be realized."

ACTION UNDER WAY?

Certain broad lines of action have already been recommended (*Coal Age*, March, 1956, p 54):

1. Planning on the export market as a permanent part of the total sales picture.

2. Organizing to reduce high ocean freight costs.

3. Reserving an adequate volume and variety of stock for export.

Since these recommendations were made, a representative cross section of authorities actively engaged in the

Better Port Facilities, Quality Coal

"It definitely is not a temporary situation but is due to the tremendous expansion of production in England and Europe and also South America as a result of increasing populations and a desire of these populations for a better standard of living. While everything went through an expansion stage because of this, the steel industry and the utility industry in particular forged ahead. The consumption of coal, therefore, increased by a far greater proportion than the production of coal in England or any of the European countries—Germany, France or Belgium—so that a definite shortage developed with the resulting exports from this country. It seems obvious to us that as long as the economy of Free Europe and South America continues to expand, they will have to obtain their energy requirements from either oil or coal as atomic reactors on a competitive basis seem too far off.

"As to the future of this market, there is no question that stabilized boat rates and trainload freight rates to Hampton Roads allowing a reduction in this freight would definitely assure us of this market on a permanent basis. For example, today it is possible to get boat rates on 3 to 5 yr at about $2 a ton less than on the spot market. Undoubtedly it will be necessary for either the importers abroad or the American producers here to provide special low operating cost colliers for this business, the same as they have done for the coastwise business to New England and for the shipment of the coal via the lakes to northwest docks. It may also be necessary for the government to subsidize American boats to place them in a competitive position for operating against foreign cargo tramp ships.

"It will also be necessary for the American producers to take a greater interest in this market and to sell steel plants particularly on their better quality coals coming from one or two large modern mines. A good deal of the coal shipped abroad today is a mixture of many mines and thus the resulting cargoes do not represent by any means the best quality of metallurgical coals in this country. Because of the high freight rate necessary to transport this coal to the steel plants in Europe or South America, it seems that eventually they will make a greater study of our coal resources and insist on only the best qualities as it is penny wise and pound foolish to pay such a high freight rate to obtain our far inferior coals, which in many cases they are now receiving.

"It is possible that there would be a permanent export market for up to 50 million tons of coal a year provided the economy of England, Free Europe and South America keeps expanding and provided the American producers are able to bring about conditions that will assure the steel plants in Europe of getting their coal on a stabilized and sound basis of freight such as the Canadian plants get via shipment by rail and boat across the lakes."

J. P. Routh, president
The Pittston Co.

export trade has been checked. These exporters generally agree on the objectives of the recommendations, but are in considerable disagreement on how they should be realized. Perhaps the most significant accomplishment so far is this:

In spite of the seller's market overseas, key men from the entire industry—domestic and export producers, export jobbers, labor leaders and railroad executives—are discussing what should be done to improve on current export merchandising. Roundtable discussion by all interested parties is the best way to thrash out differences of opinion and frequently is the forerunner to a compromise plan of action.

With a few exceptions, the industry is quite well convinced that the export market is apparently permanent. And there is increasing awareness of how easily this permanency could be knocked out if delivered prices go much higher, and of how the domestic trade could be hurt if exports should suffer a major dip. But there is no evidence yet that anyone is convinced to the point where he is willing to take a major capital risk on a 5-yr market.

SHIPPING CRITICAL

The shipping problem, of course, is the critical one to be solved in developing and preserving the export market. Cargo space is not adequate to handle present overseas orders. One authority states that cargo space has passed its peak and vessels have already been cut off from the coal trade. The shortage is reflected in the number of loaded cars that pile up in port storage yards. A spot check at Hampton Roads late in April showed that there were about 18,000 cars waiting to be unloaded. True, if enough ships come in on time, these cars could be dumped in six days. But, as is more likely to be the case, what happens when ship space is inadequate or when there are extended delays on scheduled ship arrivals? The answer is: added demurrage costs for the overseas buyer. And, incidentally, could slow turn arounds at port storage yards have anything to do with the shortage of cars in the domestic trade?

The shortage of shipping space also shows up in the high freight rates for overseas coal cargo. The price of space is completely at the discretion of independent shipping companies. And these companies are having a field day because they currently hold the impregnable economic advantage of demand greatly exceeding supply. Al-

though ocean freight rates have leveled off some in recent months, the individual charter rate from Norfolk to Rotterdam edged up close to $11 in May. The comparable rate a year ago was $7.75. Maybe the export business has been so good that most have gone along with rate increases and perhaps the guard of the trade is down. But, bear this in mind: coal has no way now of controlling future rate hikes and these could easily come with any major jump in demand for export coal space or with a major shift of vessels to other bulk cargo trade.

OPPORTUNITIES FOR MORE SHIPS

The cargo space and rate dilemma points logically and inevitably to this need: coal must act to get more vessels in the coal trade. Regardless of which way the industry turns to solve this problem, complications and opposition from vested interests will no doubt set in. But, where the welfare of the industry is at stake, no stone should be left unturned and no opportunity abandoned until its possibilities for relieving the critical cargo space situation have been completely and vigorously investigated.

Three opportunities for adding more vessels to the coal trade are in prospect:

1. Liberty ships from the Reserve Fleet might be taken out of "mothballs" and put into service. A minimum of 200 would be needed, but estimates go up to 500. Some argue that rates on Libertys (based on American crews) would offer little or no improvement over present rates, that reconditioning costs would be too burdensome, and that government regulations on their use would be too restrictive. Also they point to strong labor opposition to any efforts to man the ships with foreign crews (American crews cost four times as much as foreign ones). And, of course, tramp operators might well be expected to fight the Liberty ship idea as detrimental to their business.

But the fact remains that the Libertys offer the only extra shipping space presently available (the Navy has kayoed the idea of converting T-2 tankers because of the ticklish Middle East situation). The Maritime Commission has already indicated that it will back the Liberty effort strongly. This backing, it is believed, would also include specific recommendations to Congress for changes in the Transportation Act which would permit operational subsidies now disallowed on bulk carrying ships.

2. U. S. shipping companies—with government-allowed construction subsidies—might build new ships for the coal and other bulk trade. Spokesmen for these companies say they would be willing to build their own modern colliers and operate them under foreign flags if the coal export trade could give some kind of long term (5 yr) assurance of charter for the ships. In turn, they could establish much lower rates than presently available, e. g., $4.50 to $5 per ton base rate Norfolk to Rotterdam. Chances are that this opportunity might be developed to a point where it would bring a major adjustment in the delivered cost of U. S. coal. There is also the fair prospect that the shipping companies might go ahead and gamble on their own if they could be shot with confidence on the long term (10 yr) export coal business.

3. Foreign shipbuilders might be encouraged to construct ships for hauling American coal. Advantages here, of course, are much lower construction costs. Italian shipping interests have already reported construction of huge 22,000-ton freighters for service in the U. S. coal trade. Certainly overseas buyers, who have to pay the price of delivered coal, could be expected to give full cooperation in pushing foreign construction. The U. S. export group might well consider initiating and organizing a foreign shipbuilding effort.

ADDED TASKS: BETTER LOADING AND INSURANCE

Two other questions closely tied to the need for more cargo space should be put on the top of coal's export agenda:

1. What can be done to improve, modernize and expand loading and unloading facilities? Present equipment, both here and abroad, falls short of needs for expeditious handling of heavy coal traffic, particularly where large tonnage ships, say 20,000 tons or more, are involved. There is every reason to believe that domestic coal carriers are doing their utmost to improve their port service. The C&O, for example, expects to complete this year its $2.5 million expansion of coal-dumping facilities at Newport News. No such improvement is expected on the European end of the run. To meet this need, it might be necessary to build bulk terminals of considerable cost at strategic ports overseas. This might be a profitable venture since such terminals could be used for other bulk shipments as well as coal.

2. What can be done to cut the costs of insuring coal cargoes? Most agree that the present method is too high priced. The "i" of cif, another burden for the overseas buyer, should not be overlooked. Since this is a highly specialized problem, perhaps the first action needed is for the coal export trade to commission an expert on marine insurance to make a thorough study of possible ways to reduce costs.

CENTRALIZED MARKETING AGENCY?

Nobody yet knows the final answers to current export merchandising problems. One fact, however, stands out above all others: the whole export sales operation is being handled with far too little knowledge. Perhaps what is needed most is a centralized marketing agency (not an export-selling or coal-dumping pool) to build up a fund of reliable information from U. S. and overseas sources for guiding and promoting the export market. Its first tasks would be to gather data on the immediate shipping and allied problems.

The agency might subsequently conduct continuing studies of overseas coal markets and dollar supply, organize a customer service clinic and develop sales promotion lists. No less important would be efforts to streamline present cumbersome marketing procedures. Export shipments are frequently handled by five or six different "middlemen" between production at the mine and delivery to the overseas consumer. So, in addition to high ocean freight, insurance and transshipment costs to interior points, the customer also has to pay for each middleman's cut.

The basic objective of the centralized marketing agency would be integrated, better coordinated selling. This does not mean that an individual company or its product has to lose its identity in the export trade. On the contrary, a centralized information and sales promotion authority might open the export market for individual companies to undreamed-of horizons.

50 MILLION TONS POSSIBLE

With a truly aggressive, industry-backed export program, who can say what the ultimate limit for overseas shipments might be? A permanent market of 50 million tons is conceivable. If more stimulants to imaginative export thinking must be provided, consider such unexpected 1956 developments as these. Argentina, whose purchases of U. S. bituminous in 1955 totaled only 65,000 tons, now reportedly wants to buy 700,000 tons for delivery this year. In another case, previously noted, Poland has recently indicated intentions to purchase 130,000 tons of U. S. coking coals.

The Coal Commentator

More Still Needed

"Never before have we so sorely needed to utilize the best brains of the country. The needs of business and industry for young people of superior talent and training are particularly urgent."—Theodore V. Hauser, Sears-Roebuck Foundation, in commenting on the Merit Scholarship Program supported by 19 corporations and corporation foundations, including the McGraw-Hill Publishing Co., Inc.

The aim of the program, set up in 1955 and handled by the National Merit Scholarship Corp., Evanston, Ill., is to locate outstanding young people, see that they get a chance at obtaining proper training, and make it easy for corporations to support these objectives. At present, some 525 high-school seniors are being aided to the tune of $3,160,000 in scholarships.

The coal industry, along with the many others, has already reached the conclusion that more trained men are a necessity. One evidence is the growing number of scholarships being created by the industry. Another is the activities of the Vocational Training and Education Committee of the National Coal Association, which held another of its regular meetings with the advisory committee of the Department of Mining and Metallurgical Engineering of the University of Illinois April 20-21. One conclusion from this and previous such sessions is that mining schools need more support from the industry they are set up to serve. **A critical look at industry needs for trained manpower, and at the benefits such trained manpower brings, should be sufficient to stimulate a major increase in such support.**

Foam Vs. Dust

Dust suppression during cutting is the subject of a new approach at the Madeley Wood colliery, in Shropshire, England. In essence, the aim is to establish an artificial barrier at the mouth of the cut to keep the dust in the kerf and prevent it from becoming air-borne. The barrier necessarily must be one that will maintain the seal while the bits are traveling through. The answer is being sought in foam supplied to the bits blocks and bits.

Foam advantages are: More suppression per gallon of water; greater entraining surface by reason of the bubbles; a preference for the finer dust particles rather than the coarse; and concentration of most of the foam at the point of maximum dust production. **Results to date? "Foam appears to have very real possibilities as a dust-suppressing agent for cutting."**

Frameground Deadline

The moratorium on installation of frame-grounding facilities for offtrack mining equipment has been ended by the U. S. Bureau of Mines, effective Aug. 1. The moratorium was declared Nov. 30, 1953, to provide an opportunity to develop a practicable device or devices that would be equivalent to framegrounding with a separate grounding conductor. At least two companies now offer such equipment, and additions to the list may be expected in the near future. Consequently, the bureau has reinstated its requirement that lack of a frame ground or a suitable ground-fault protective device will result in citation for violation of the safety code of Public Law 552, whichever is applicable, after Aug. 1. However, the operator can still escape citation if he can show that equipment is on order, since the bureau will allow a reasonable time for receipt and installation.

Final Seal

Perhaps now it can be considered final and official—coal's comeback, that is. The reason for reaching this conclusion is that the financial community is now putting its seal of approval on coal's resurgence in the form of substantial investments in coal shares. As one example, Incorporated Investors, of Boston, invested in nearly $11 million worth of shares in seven bituminous coal companies in the first quarter of 1956. Together with some $4 million previously purchased, this brought 11 holdings, at market, up to $15,105,100, or 5.8% of the organization's total assets of $258,159,343 at the end of the first quarter of 1956.

Coal can feel happy about this reversal of thinking for two reasons. First, it means that it has attained a new level of public respect when the money men agree that its future is real and bright. Second, it means that it will be easier for coal to find the capital it will need to create the new producing facilities the expansion in business will require.

Anthracite, Too

"The encouraging upturn in production and sales of anthracite will set the pattern for the annual convention of the Pennsylvania Retail Coal Merchants' Association to be held at Galen Hall, near Reading, Pa., May 23-24."—Ebner S. Abrams, convention chairman, in a preliminary meeting announcement dated May 14. Like the reaction of the financial community to developments in the bituminous industry, this reaction of the retailers to developments in anthracite marks a definite break with the past attitude of most retailers. Even though anthracite still is a long way from being out of the woods, and is the particular target of natural gas in its primary territory, things are looking up with a definite gain in tonnage for 1956 for the first time in many years. **The dealers can do wonders in keeping the ball rolling—and incidentally make something for themselves, too. May their enthusiasm and determination continue to wax.**

ELECTRIC SHOVEL moves the cover from the No. 5 coal in 21-cu yd bites. Working banks up to 60-ft, the machine handles 450,000 cu yd of dirt per month. In this unusual view the shovel is seen "transplanting" a mature tree.

Blackfoot strips, hauls, cleans and dries two coals in an . . .

Exercise in Coordination

WALKING DRAGLINE with 165-ft boom and 14-cu yd bucket works around the clock uncovering No. 4 coal. Unit moves 350,000 yd of material in 30-day month.

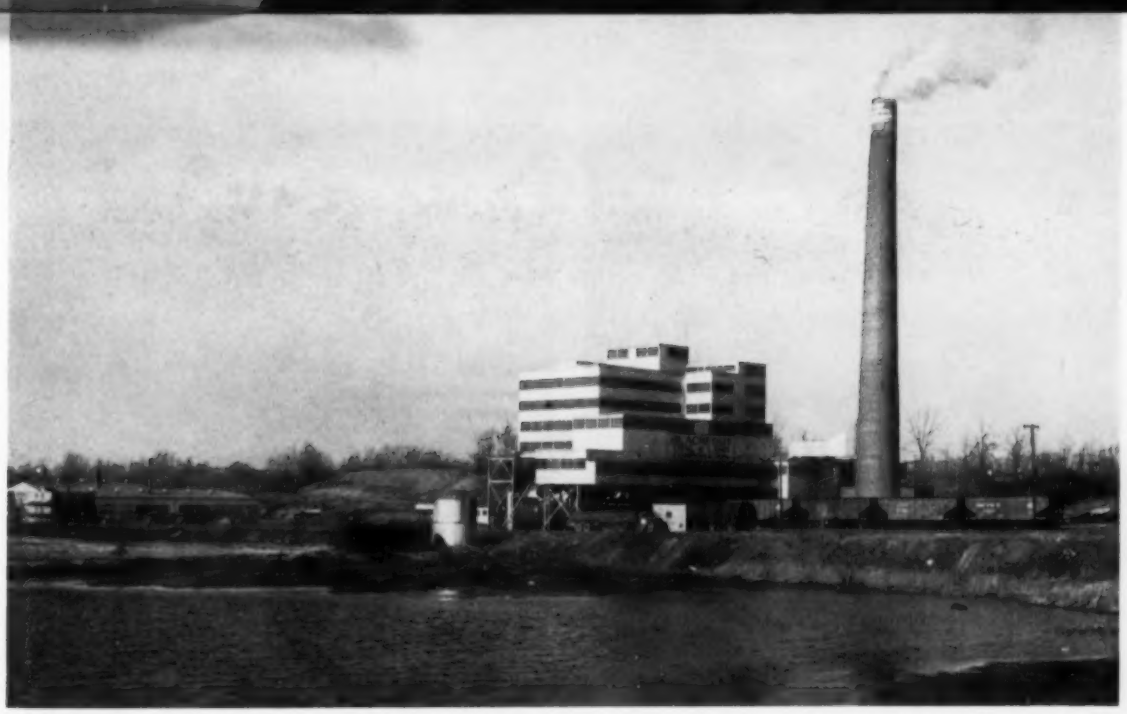
Combined rail and truck haulage, stripping with both shovel and dragline, complete washing and thermal drying assure quality with efficiency.

By A. E. FLOWERS
Associate Editor, COAL AGE

EFFECTIVE USE of machines selected to meet local conditions results in smooth operation at the Blackfoot Coal & Land Corp., Kerwin, Ind. Strip mining in two pits, the company coordinates men and machines to produce 3,500 tons of clean coal per day. About 1,200 tons is produced from the No. 4 vein and the remaining 2,300 tons from the No. 5 vein. Features include shovel and dragline stripping, rail and truck haulage, complete washing and thermal drying.

MINING CONDITIONS

The thin No. 4 vein averages only



PREPARATION PLANT on NYC R.R. processes 3,500 tons of coal in one shift. Features include total washing, centrifugal and thermal drying. Tall smokestack prevents extreme fines in dryer from escaping into atmosphere.

28 in and is covered by shale and surface material that is not considered difficult to blast or handle. A 2- to 3-in layer of fireclay underlies the coal and a sandy shale forms the main bottom. The No. 5 coal is thicker, averaging 52 in. Material covering the No. 5 vein, starting at the top of the coal, includes 36 in of shale, 18 in of limestone, then varying thicknesses of shale and sandstone and surface material.

The center of operations is about 12 mi southeast of Oakland City, Ind., where Blackfoot's preparation plant, shop and mine office are located. Mining in the No. 4 vein is centered in an area about 2½ miles southeast of the cleaning plant. Coal recovery in the No. 5 vein is carried out 7 mi southwest of the plant.

DRILLING AND BLASTING

A gasoline-driven Hardsoeg sidewall unit bores 6-in horizontal holes in the No. 4 overburden. Holes normally are spaced 18 ft apart in a row 2½ to 3 ft above the coal and drilled to a depth of 65 ft. Two men are regularly assigned this job on the day shift with help on the second shift as needed. This usually does not require more than 25% of the second shift.

Airmite, a liquid-oxygen type explosive, is used to break the overburden. The charge per hole varies in

DIESEL-ELECTRIC LOCOMOTIVE pulls train of five 35-ton cars over 7 mi of 36-in-gage track to preparation plant. Complete trip may be loaded in as little as 4 min. Three such trains carry 2,500 tons per shift.

SIDEWALL DRILLS include crawler-mounted electric (left) and rubber-tired gasoline-powered units. Horizontal holes are drilled on 18-ft centers to a maximum depth of 65 ft. A vertical rotary drill is a recent addition.

Blackfoot methods are tailored to suit conditions

OVERBURDEN BLASTING is done with liquid-oxygen explosive on day shift using m-s delays near populated areas.

32-TON TRACTOR-TRAILER HAULER is loaded on coal berm while tractor shovel gathers loose coal and cleans pit.

TRUCKS DROP COAL into 100-ton field hopper to be elevated to second 100-ton unit over narrow-gage railroad.

DESTINATION of train is 320-ton raw-coal bin at cleaning plant where trucks from No. 4 pit also are unloaded.

accordance with the thickness and toughness of the cover. For less than 45 ft of cover, a typical shot would be 231 No. 3 cartridges of Airmite distributed in 18 holes. To reduce vibration in nearby residential areas, the company uses 25-ms delay blasting caps with Primacord in each hole in the No. 4 pit. Charges are set off only on the dayshift.

In the No. 5 pit a Sullivan electric sidewall unit bores 7-in holes 45 ft deep on 18-ft centers. The distance holes are located above the coal depends on the interval to the limestone, holes being drilled either immediately above or below it. If the sandstone layer thickens appreciably, a group of upward holes is drilled. These are placed midway between the regular horizontal holes and angled upward to permit Airmite to be placed as close as possible to the sandstone.

When the overburden is 35 ft or less, No. 3 cartridges are used. If the overburden is thicker, No. 5 units are required. All holes are detonated simultaneously with instantaneous blasting caps and Primacord.

A new Bucyrus-Erie 50-R vertical rotary dry-type drill capable of drilling 10⅝ in holes is being put to work in the No. 5 pit. With this unit drilling the thicker and tougher overburden, the company expects to improve blasting results in areas that do not lend themselves to horizontal drilling. This is particularly true where there is a thick layer of sandstone in the upper portion of the overburden.

UNCOVERING THE COAL

Three stripping machines are available to remove overburden at Blackfoot. A Bucyrus-Erie 500W electrically-powered dragline with a 165-ft boom and swinging a 14-yd bucket works around the clock, seven days a week in the No. 4 pit. Working banks up to 50 ft high, the dragline uncovers an 85-ft strip of coal as it follows the outcrop. A 15- to 20-ft berm of coal is left along the highwall in each cut after the coal is loaded. This dragline moves an average of 350,000 cu yd of overburden in a month.

A 21-cu yd Bucyrus-Erie 550B electric shovel, also working three shifts, seven days a week, uncovers the No. 5 coal. In an average 30-day month this machine will move 450,000 cu yd of overburden. It handles up to 60 ft of cover while uncovering a 45-ft strip of coal.

When the cover is consistently more than 60 ft thick and there is a considerable area of it, a Bucyrus-Erie 5W 5-cu yd dragline with a 120-ft boom is used as a booster unit to help the shovel. Driven by twin GMC diesel engines, the unit performs a variety of other duties. Among these are road-building, dam construction, ditching and some spot stripping in areas with thin cover.

LOADING AND HAULING

Coal loading in both pits is done only on the day shift. Any fine, loose impurities left on the coal by the stripping units is scooped up by Hough Payloaders or scraped off by bulldozers. One of each is assigned to each of the stripping pits. The Payloader also picks up loose coal missed by the loading shovel and straightens the edge of the berm. The unit also is available for spot assignments, such as moving pumps or smoothing the road in the loading area.

A Bucyrus-Erie 54B shovel with a 4½-cu yd dipper loads the No. 4 coal. Powered by a 275-hp Cummins diesel engine, the shovel also is equipped with a Torcon torque converter.

Three 32-ton tractor-trailer trucks equipped with power steering haul 1,200 tons of No. 4 coal per shift to the preparation plant, about 2½ mi away. Tractors are International Harvester LD 314's and trailers are 40 cu yd United Iron Works units. Empty trucks travel into the pit on the bottom rock until they reach the loading shovel. They then ramp up onto the coal and swing around to the berm beside the loading shovel, headed toward the preparation plant. After being loaded, the trucks travel on the coal berm until they reach the access road leading to the main road. Trucks are equipped with Fuller 10-speed one-stick Roadranger transmissions. The units provide two speed ranges, electrically selected, without the need for an auxiliary transmission or two-speed axle.

The No. 5 coal is loaded by a Bucyrus-Erie 85B electric shovel equipped with a 5-cu yd dipper. Five International Harvester W-4042 tractors, pulling 40 cu yd United Iron Works trailers, shuttle back and forth between the pit and a field loading station serving a 7-mi rail link with the cleaning plant. Located about 1½ mi from the pit, the loading station includes a 100-ton bin for receiving the coal from the trucks, an elevating transfer conveyor and a second 100-ton bin erected over a 36-in-gage railroad. Coal is transferred from truck bin to the railroad bin as soon as trucks are unloaded. Thus a full bin is always available when the train of railroad cars is placed for loading.

Three trains, made up of five 35-ton Differential side-dump cars, each pulled by a General Electric 35-ton diesel-electric locomotive, haul coal 7 mi to the preparation plant. It takes about 1 min to load a car and a complete trip has been loaded in as little as 4 min.

Locomotives have a top speed of 30 mph and make a round trip, including loading and unloading, in about an hour. There are two passing tracks in the 7-mi route to speed the movement of trips. Switches at the passing tracks are spring-type units that permit trains to enter or leave the passing area without stopping to have switches thrown. A crew of seven men and a foreman maintain the company's narrow-gage railroad. A locomotive repairman services the diesel units on idle days, checking the mechanical parts and also lubricating them.

ROADBUILDING

Truck roads are laid out with grades limited to a maximum of 3% against the loads and 5% with. Roadbeds are built up with shale or tipple refuse to form a 2½- to 3-ft base. This is packed down, smoothed and then topped with No. 5 crushed limestone. More limestone is added as needed.

To maintain a smooth running surface, the company uses a Galion motor-grader to scrape the road. Drags, pulled either by trucks or a Payloader, also are used to keep the road smooth. Drags are favored in alternately freezing and thawing weather since they leave the surface in better condition for fast drying.

MAINTENANCE

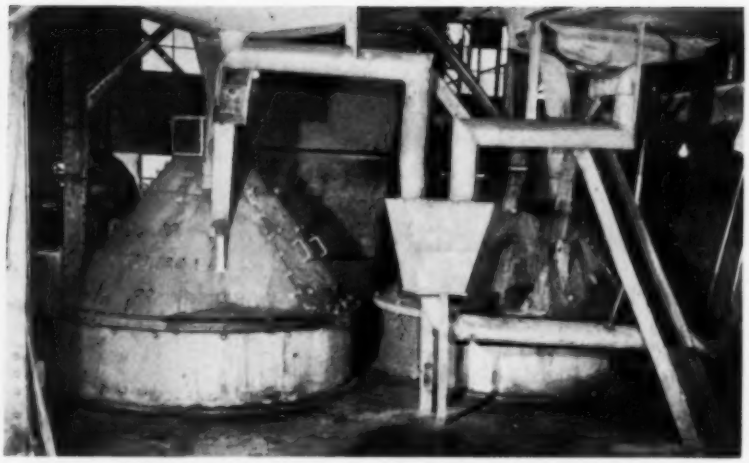
Maintenance is centered in a well-equipped building near the preparation plant. Facilities are divided into three sections: a heated garage for parking and servicing 10 of the large tractor-trailer units; a supply room; and a machine shop. Machine shop work, as well as shovel and dragline work is supervised by the master mechanic. The responsibility for maintaining Blackfoot's fleet of 11 tractor-trailers is assigned to the truck foreman. Six of the trucks are garaged near the field loading station and are brought to the main shop only for major overhauls or work that can't be done in the field.

Maintenance of trucks, diesel locomotives, tractors and pumps is handled by four men, two on each of the first and second shifts. Machine shop work is done by four welders, two of whom work on the night shift, one machinist and a blacksmith.

AUXILIARY SERVICES

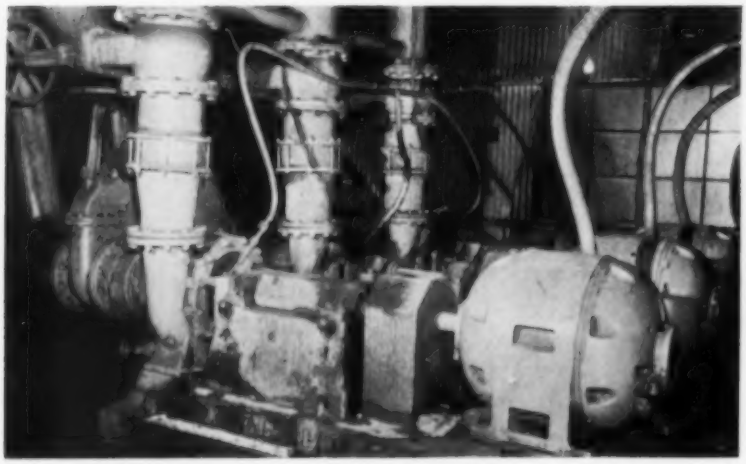
Important auxiliary equipment used at Blackfoot includes bulldozers and portable pumps. An Internatonal Harvester TD 14 bulldozer works in the dragline pit, performing such jobs as

COAL IS CLEANED in wash boxes receiving 4x1½ and 1½x0 feed.

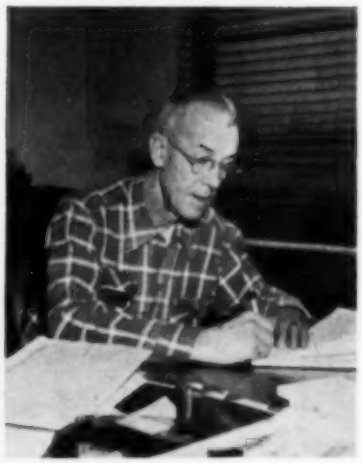


CENTRIFUGAL DRYERS are primary dewatering units for ⅜x10M which is sized on vibrators. Product joins coarser material for final drying.

Coal preparation at Blackfoot includes jig washing



THREE PUMPS on ground floor deliver circulating water to wash boxes in upper part of plant. Water must be treated with lime to control pH.



SUPERINTENDENT H. E. Fitch heads activities at Blackfoot's stripping.

building roads, leveling spoil banks and moving power cables. A group of four skid-mounted pumps, including two 6-in Barnes, one 4-in and one 3-in Jaeger units, is available for dewatering duties at the No. 4 pit. A Caterpillar D7 bulldozer performs utility work in the shovel pit. Six Fairbanks-Morse electric pumps handle the dewatering work in the No. 5 pit.

RECLAMATION

Work is not completed with the removal of the coal to the stripping limit. The tops of the spoil banks are leveled by the pit bulldozer in preparation for future reforestation. Regular tests are made of the soil acidity to determine if it is suitable for growing trees. When the acid producing materials have been leached out or weakened sufficiently to permit growth, seedling pines are planted on 8-ft centers.

Blackfoot strips about 125 acres of coal land per year and the company tries to keep the reforestation program moving at the same pace. This program requires about 125,000 trees to be planted in February and March of each year.

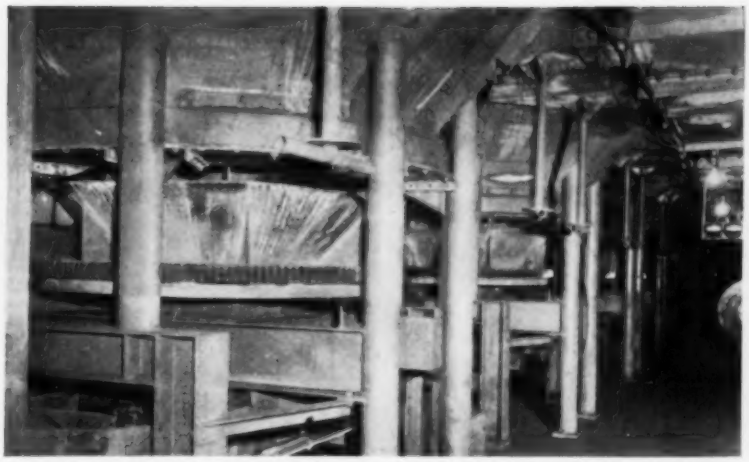
PREPARATION

Trucks and railroad cars discharge into a 320-ton bin at the cleaning plant. A 60-in reciprocating feeder then starts the raw coal on its way to a 30x60 McNally Pittsburg double-roll crusher for reduction to 8x0. The crushed product drops onto a 48-in elevating conveyor and is carried 200-ft to the top of the plant. It then passes to the raw-coal shaker, which separates it into 8x4, 4x1½ and 1½x0 fractions.

The 1½x0 flows to one of the McNally Norton wash boxes. After the 8x4 is broken to 4x0 by an American Pulverizer ring crusher, it goes to the coarse-coal wash box.

Clean 1½x0 passes by chute to a classifying screen which removes the ⅜x0 and water for delivery to a settling drag tank. Concentrated ⅜x0 is removed by a drag conveyor and discharged to a dewatering elevator that

NERVE CENTER of plant is pushbutton desk controlling equipment.



HEAT DRYING of 1¼x10M is done by a battery of five cascade-type dryers that reduce surface moisture to 2%. Dryers exhaust through 175-ft stack.

and mechanical and thermal drying in modern plant

Blackfoot Coal Officials

President	Charles C. Kerwin
Vice President	A. C. Ancona
Secretary	Isador Kahn
Treasurer	John L. Barnett
Superintendent	H. E. Fitch
Chief Engineer and Assistant Superintendent	L. M. Morrison
Assistant Engineer	Bernie Sermersheim
Electrician	J. R. Ault
Master Mechanic	M. L. Winkler
Preparation Manager	Earl Davis

MAINTENANCE CENTER includes large heated garage for 10 trucks, supply house and machine shop. Six other trucks are housed near field station.

feeds two 8x4-ft Simplicity dewatering vibrators. The dewatered product flows to a pair of Carpenter centrifugal dryers equipped with 28M screens for initial dewatering. After the material leaves the centrifugal dryers, it falls onto a two-compartment conveyor where it is mixed with the clean 1½x⅜ and carried to a battery of five Baughman Verti-Vane heat dryers. The dried 1½x28M returns to the blending conveyor and then flows to railroad cars on Track 5.

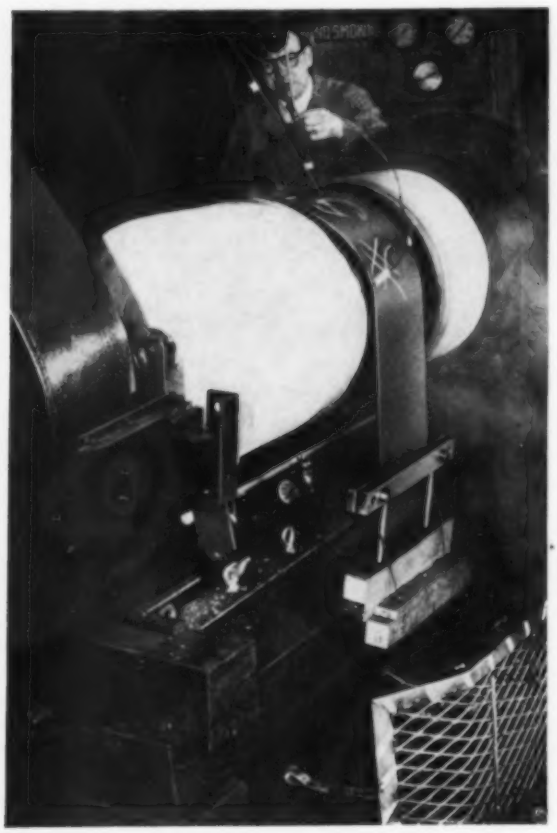
Gases from the five dryers travel to a common smokestack that rises 175 ft into the air. From a 20-ft-diameter base, the brick stack tapers to 10 ft at the top. This tall stack was installed in 1952 to solve the problem of dust covering the roof of the plant and also causing discoloration and corrosion of the metal plant siding.

The 4x1½ product from the coarse-coal wash box is separated into a variety of sizes depending upon the needs. Plant flow is such that any of the larger sizes can be sent to a McNally Pittsburg 30x60-in double-roll unit for reduction to 2x0. The crushed product falls onto a gravity-discharge elevator that carries it to the top of the plant. It then drops onto two 5x12-ft Allis-Chalmers Ripl-Flo vibrators that remove the plus 1¼-in coal and discharge it into secondary crushers. The recrushed material rejoins the regular flow of 1¼x0 and passes to two triple-deck 6x16-ft Allis-Chalmers Ripl-Flo vibrators. These screens then make a final separation into 1¼x¾, ¾x10M, 1x10M, 1x½, ¾x⅜, 1¼x10M and 1x¾ as needed. Vibrator products drop onto the mixing conveyor which carries them to loading booms for delivery to railroad cars.

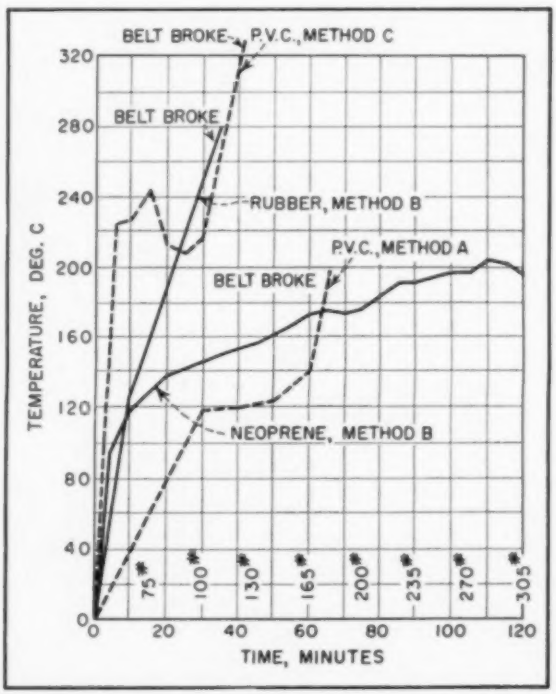
Overflow from the drag tank passes to a slurry cone where solids are concentrated and then delivered to a sludge area by a Morris pump. Fresh water for the plant is obtained from two company-made lakes, one covering 15 acres and the other 10. The acidity of the water is normally high and must be neutralized with lime before the water is suitable for use in the cleaning plant. On each shift, 10 to 12 bags of lime are added to bring the pH to a value that will not result in corrosion of pipes.

To control dust in the plant, particularly around crushers and vibrators, the company has installed water sprays at strategic locations. To provide better wetting of the dust, Johnson March Compound M is used with the spray water.

FEWER BELT FIRES will follow wider use of testing procedures developed by the U. S. Bureau of Mines, permitting belt manufacturers to produce and coal-mine operators to specify and obtain flame-resistant conveyor belting.



DRUM-FRICTION TEST measures belt's resistance to ignition by friction.



HOW NEOPRENE AND RUBBER met the drum-friction test.

Method A—No ventilation or coal dust.

Method B—Ventilation, 300 fpm; coal dust blown between belt and drive pulley at 5-min intervals; PVC curve not shown because sufficient tests were not made to reach conclusions.

Method C—Method now used in standard test; ventilation, 300 fpm; no coal dust.

Testing Conveyor Belts For Flame Resistance

Newly developed tests check major belt hazards: susceptibility to ignition and propagation of fire. Rubber ranks lowest, neoprene and PVC highest.

DEVELOPMENT of a fire resistance test for coal mine conveyor belts by the U. S. Bureau of Mines means that coal-mine operators now have a way to distinguish a flammable belt from one that is safely fire-resistant. Consequently, belt manufacturers can now produce, and mines can now purchase, to a precisely stated standard of fire resistance.

THE DANGER

Conveyor belts are being used more and more in coal mines because of their efficiency in removing coal to the surface. In 1945 196 mi of underground conveyor belt was installed in 117 bituminous coal and lignite mines in this country. These mines produced 9% of the national output. In 1953 608 mi of belt was installed in 322 mines, which produced 29% of the 1953 total.

A disastrous belt fire in a mine in England a few years ago resulted in the loss of 80 lives. The tragedy focused the attention of the American coal-mining industry on the fire hazard. The U. S. Bereau of Mines went back over its records and discovered the startling fact that it had investigated more than 50 belt fires in the few years that conveyor belts had been used to any extent in American coal mines.

In August, 1954, a bureau research team started extensive investigations to find out what qualities a conveyor belt must have to be considered fire-resistant. Tests were conducted on more than 100 samples of conveyor belting provided by some 30 manufacturers, United States and foreign.

In November, 1955, the bureau published its schedule of requirements and tests. Any belt manufacturer may submit samples to the bureau and any belts which pass the bureau's tests may be labelled "Fire-Resistant, USBM Schedule 28." Each manufacturer has a number; for example, 28-1.

THE TESTS

The bureau has standardized two tests, a flame test and a drum friction test, in the course of which it has put its finger on the two major hazards associated with rubber conveyor belts. The flame test measures a belt's ability to propagate fire to which it may be exposed. The drum-friction test measures a belt's ability to start a fire should the belt become jammed and the drive pulley continue to run.

In the flame test, a belt specimen 6 in long and ½ in wide is held in a bunsen burner flame for 1 min in still air. The burner is turned off after 1 min and air is blown across the specimen at 300 fpm. Flame must not last more than 1 min; afterflow must not endure more than 3 min, on the average, for four specimens—two cut along the warp and two along the weft of the belt under test.

The second test, drum friction, employs a belt specimen 5 ft long and 9 in wide. The specimen is wrapped on a pulley 18 in in diameter and driven at 110 rpm. Ends of the pulley are insulated to reduce heat loss. One end of the specimen is clamped to the floor. Weights are added to the other end in 25-and 35-lb increments at intervals of 15 min. The test runs 2 hr, during which time the weight is increased from an initial 50 lb to a final 270. The belt specimen covers approximately 180 deg of the drum surface. Three thermocouples are inserted between the the plies to measure temperature rise in the belt. During the entire 2-hr test a current of air at a velocity of 300 fpm is maintained across the drum and belt. To pass the test and be considered fire-resistant, a specimen must not flame, glow, or develop a temperature over 250 C at any thermocouple during the 2-hr period.

THE RESULTS

In the course of its investigation, the bureau has tested three types of belting: the general-purpose belting now widely used in coal mines and having covers of natural rubber or GR-S synthetic rubber; some belts with neoprene covers; and a few belts with polyvinyl-chloride covers.

The flame tests showed neoprene and polyvinyl-chloride belting to be self-extinguishing. Neither will support combustion after the flame is removed. None of the natural or GR-S rubber belting has passed the bureau's flame test. All samples continue to burn after ignition until they are completely destroyed.

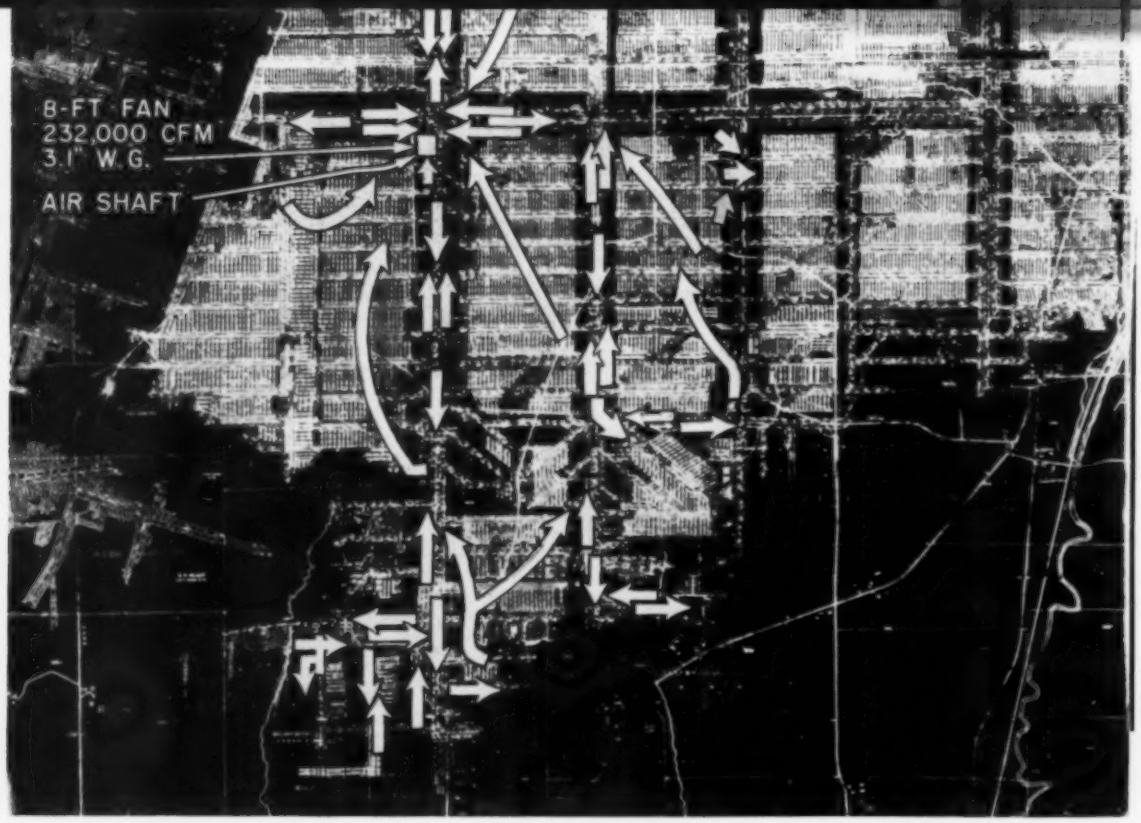
The drum-friction test disclosed that the rubber conveyor belts used underground today generate more heat from friction at a faster rate than neoprene belts. Some rubber belts burst into flames, other glow red hot, and all of them broke before the 2-hr test was completed. To date neoprene belts tested by this method have neither flamed nor glowed and generally have not broken.

The neoprene belts dissipated heat more readily than the other types tested. After neoprene belts reached 180 to 220 C their heating curves leveled off to nearly constant values despite increased friction from additional weighting. The heating curves of polyvinyl-chloride belting tested steadily rose as the test progressed. They generally broke during the test, but are considered fire-resistant nonetheless because they did not flame or glow.

Whether a belt breaks or not during the drum friction test is actually irrevelant to the bureau since this is a flammability test, and not one for physical strength. In coal-mine service a section of jammed belting subjected to the friction of a spinning drive pulley would probably be cut out and the belt respliced, regardless of whether it broke or not. Incidentally, simulating service conditions by the addition of coal dust and running the test under ventilation increases the tendency of the rubber belts to flame but does not affect the neoprene belts appreciably.

CONCLUSIONS

Rubber conveyor belts clearly are a major flame hazard in coal mining. Both the flame test and the drum-friction test have demonstrated neoprene's acceptability on that score. Demonstrable fire resistance may now be added to neoprene's other qualifications; oil, weather, heat and abrasion-resistance as a material for coal-mine conveyor belting.



WIDESPREAD WORKINGS in 30-in coal require good ventila tion practices to keep air flowing efficiently at Kramer mine.

Using a Ventilation Survey

How a "stitch in time," a complete ventilation survey, eliminated the need for a new airshaft, saved the cost of driving new airways and made it possible to ventilate larger area without speeding up the fan.

SYSTEMATIC ENGINEERING ANALYSIS and planning have boosted and maintained ventilation efficiency at Kramer mine of the Northwest Mining & Exchange Co., Stump Creek, Pa. A thorough ventilation survey of the entire mine before the time when more air would be needed and an analysis of the results of the survey followed by appropriate steps to gear the ventilation circuit to future needs is paying off today. Savings include: (1) Elimination of the need for a new 400-ft shaft to ventilate a 400-acre tract of undeveloped coal; (2) saved the cost of driving new airways; and (3) made it possible to ventilate the larger area without speeding up the fan.

The men responsible for planning the ventilation work at Kramer include Carl A. Peterson, vice president and general manager; D. M. Doughman, chief engineer; Earl Haag, mining engineer; W. M. Mowrey, superintendent; George Pudlo, mine foreman; and Merle Holsopple, safety inspector.

EARLY PLANNING

As early as 1947, Northwest's planning group was looking ahead to the time when the thicker areas of coal would be exhausted and development would have to be stepped up in the thin 30-in coal. To maintain the same production in the thinner coal more entries would be needed. These in turn would increase the number of splits required. Therefore, to supply each split with enough air, more would have to be delivered to the innermost areas. With 400 to 600 ft of cover and a thin seam of coal, management naturally didn't want to sink a new shaft unless it was necessary. Hence, the company acted early to prevent ventilation problems from arising in the foreseeable future.

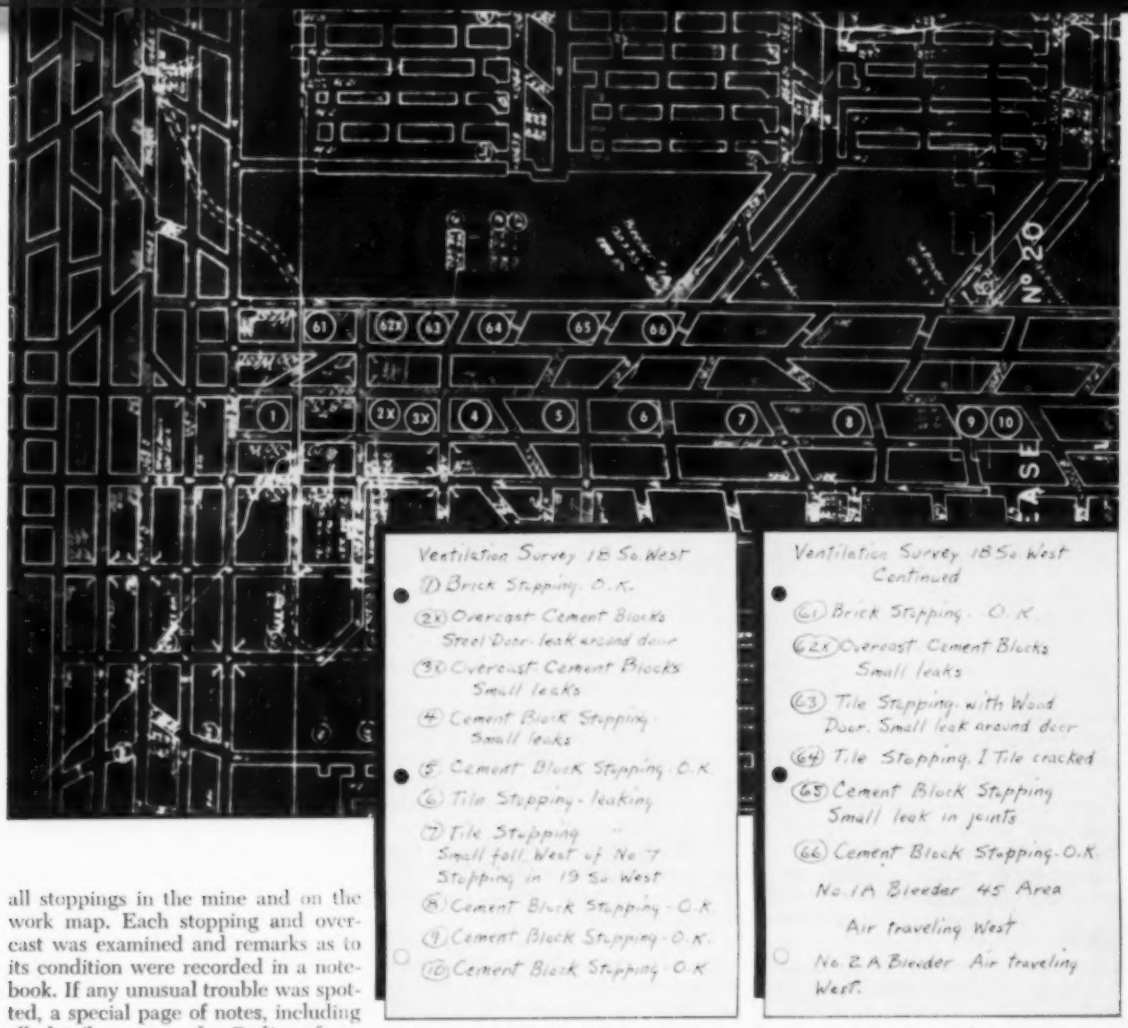
Because of the longer circuit that would require the fan to deliver air over longer distances, management knew that all airways would have to be kept in as good condition as possible. And all stoppings would have to be as near leakproof as possible. To determine what could be done to meet the future needs, the company decided to make a complete study of the ventilation system.

TACKLING THE PROBLEM

The first step in studying the future ventilation needs was to plan a systematic survey to find what was needed, rather than rely on a hit or miss method to tackle ventilation problems as they came up.

The first job was to gather all the pertinent information about the condition of the existing ventilation circuit. To do this, several competent men familiar with the mine were given the job of traveling all intake headings and return aircourses to make detailed notes and also to plot data on a work map as they went.

The engineers assigned numbers to



VENTILATION SURVEY to locate weaknesses in air circuit include recording complete details in notebook and on map as headings are inspected.

all stoppings in the mine and on the work map. Each stopping and overcast was examined and remarks as to its condition were recorded in a notebook. If any unusual trouble was spotted, a special page of notes, including all details, was made. Bodies of accumulated water also were sketched on the map. Special attention was given to any condition that would hinder air flow in the main returns and bleeders. Roof conditions and other items, such as, leaking water traps or overcasts were noted and records made.

If rock falls were met, their size was recorded and an estimate made of the labor that would be needed to clean them up. As the inspection progressed along the panel barrier pillars, conditions found there were noted for reference in case additional headings had to be driven in the future.

Information gathered in the mine then was given to the engineering department for plotting on a black and white map having a scale of 100 ft to the inch. To provide a useful, easy-to-read map, a color scheme was worked out for the various items to be shown. For example, return air was indicated by red arrows, intake air by green arrows, bodies of water by solid blue, rock falls by red, solid caves by black. In addition, all areas with a restricted cross section resulting from falls, etc., were located on the map.

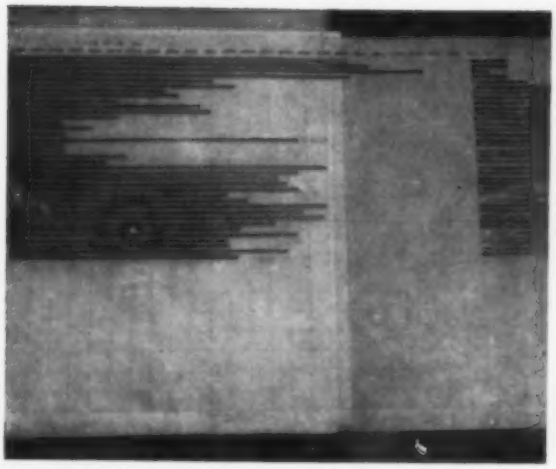
MAKING THE PRESSURE SURVEY

The next step was to take barometric pressure readings throughout the air circuit to determine the changes in pressure in the mine circuit. Starting at the bottom of the shaft, instrument readings were made along intake headings and return aircourses at intervals determined by the condition of the area. For instance, if the conditions were uniform, fewer readings were taken than in the areas where there were changes in cross-section area and falls. A second aneroid barometer was used at a base station outside the mine to measure the changes in atmospheric pressure at 5-min intervals while the underground work was carried out. Thus the underground values could be corrected and the true pressure drop calculated. To complete the survey data, the quantity of air flowing by each point where underground barometer readings were taken was measured with an anemometer. The anemometer readings were made at the same time as the barometer readings.

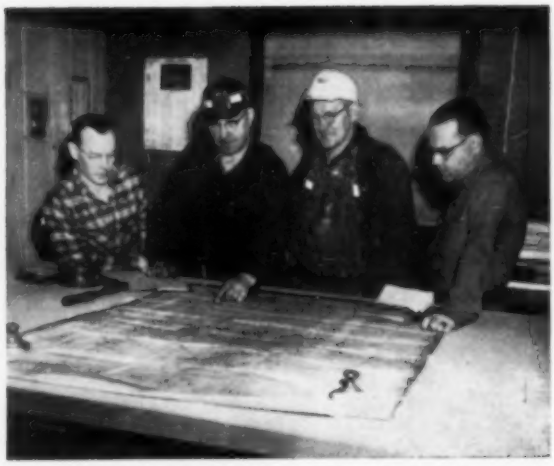
At the end of each day, all the information gathered underground was given to the engineers. They converted the barometer readings into inches of water gage and plotted the results on the master ventilation map along with the quantity of air at each point.

PLANNING THE CLEANUP

As soon as the survey was completed and all the data were plotted on the master map, a conference was held to analyze the ventilation system. Participating in the discussion were the chief engineer, mining engineer, superintendent and mine foreman. Their goal was to set up a method of improving the ventilation circuit well ahead of the time more air would be needed in the new development work. The engineers pointed out serious leakage losses and the spots that were restricting the flow of air and thereby increasing the resistance. Suggestions then were made as to the best way to tackle the various rehabilitation jobs. The purpose was to help the mine foreman direct his efforts to get the



BAR GRAPHS provide continuous picture of air flow. Separate sheet for each split emphasizes variations since a large scale is used with zero at left far off chart.



CONFERENCE among engineers and operating men results in plans to improve ventilation system well ahead of the time more air will be needed in the expanded workings.

best results. Responsibility and authority for carrying out the improvement work rested with the mine foreman.

Rehabilitation work was started where it would produce the most improvement in the shortest time. Rehabilitation then progressed to the area where the next greatest improvement could be made, and so on until the job was completed. The next task was to concentrate on enlarging passages where the cross-section area was too small and to retimber the headings.

WHAT WAS ACCOMPLISHED

Benefits of the improvement program were noted shortly after the rehabilitation work was started. More air was delivered to the working areas and, as a result, there was an ample supply for advancing headings. As more men and equipment were moved into the newer areas in the thinner coal, adequate air was available for the new splits. The cleanup work permitted an additional 400 acres of coal to be mined and ventilated with the existing fans and air shafts. Thus a big capital expenditure was avoided.

MAINTAINING THE CIRCUIT

To keep the ventilation system in top condition, the company makes a complete pressure survey every two or three years. All air courses are covered by the survey, stoppings are inspected and general conditions are noted. This information is then plotted on a ventilation map and a systematic cleanup and repair program is worked out. By making these regular surveys and then following up with the necessary repair work the system is kept operating at a maximum efficiency.

A continuous inspection is made of the ventilation system and the condition of rockdusting by the ventilation inspector. His duties also include traveling the mine with a methane detector, which he uses to take air samples at all splits, main returns and gob areas. It takes him about two weeks to make the complete mine circuit in conjunction with his rock-dust inspection duties.

In addition to the required weekly ventilation measurements, by-weekly reports are made on the condition of each split, main returns, intakes, gob areas, and bleeders as reported by the ventilation inspector. The following information is included for each of the locations: volume of air; percent of methane; quantity of methane liberated in 24 hr; increase or decrease in methane liberated; date; barometer reading and water gage.

Rock-dust samples are taken regularly and analyses are made to determine the quantity of incombustible in the mixture. Results of the tests are given to the mine foreman and superintendent and also are recorded on a special rock-dust analysis map by the engineering department.

Another important step in maintaining ventilation efficiency is the use of bar graphs to show at a glance the quantity of air flowing in the splits.

The engineering department keeps for each split a separate ventilation chart on which is shown the data reported in the bi-weekly ventilation report. The engineers also make a bar graph showing the quantity of air flowing in the split. Bar graphs for each of the points where air is measured are made on 10x10 cross-section paper. Each sheet is large enough to plot the data for a period of nearly 3 yr. Thus management can see at a glance how present conditions compare with those of the past, and thus determine quickly if week-to-week variations require attention.

Every 2 wk, after ventilation reports are completed, a conference is held to review the ventilation in all areas of the mine. Participating in the meetings are the chief engineer, mining engineer, superintendent, mine foreman and safety inspector. Ventilation reports and charts are studied carefully and methods of improving the flow of air are developed if necessary. The burden of maintaining the ventilation at maximum efficiency rests on the mine foreman and these bi-weekly ventilation conferences are especially helpful by making available to him the graphic and statistical information prepared by the engineers. Furthermore, the superintendent and safety inspector are available for discussion and advice. The bi-weekly schedule for the conferences was decided upon to prevent troubles from getting far out of hand.

Kramer mine is a gassy mine, and for this reason management endeavors to keep everyone constantly alert to prevent bad practices from developing. A daily gas report is sent to the vice president and general manager, regardless of whether or not gas is detected. If methane is reported, the area must be investigated, safety inspector or section foreman, and a written report must be submitted telling how and why the gas gathered and the action taken to remove it and to prevent a recurrence. The company reports this policy keeps bad practices from starting and prevents neglect of minor things that could develop into more serious problems.

Researching the Wood Roof Pin

Problems and possibilities developed in studies at West Virginia University

By JOHN R. FITZGERALD JR.
Morgantown, W. Va.

WOOD PINS may find further application in support of coal-mine roofs as a result of experiments recently conducted at West Virginia University. Data collected show that wood has the strength required for the job. The greatest limitation, however, is the development of an efficient anchoring device for the upper end of the pin. Of the many types of fastenings tested so far, the simple slot and wedge best performs the actual task of holding the pin in the roof.

HOLDING CAPACITY THE KEY

Slot and wedge fastenings are simple, cheap, easily manufactured and easily installed. But just how well would they work in actual practice? An effort to determine the holding capacity of wood pins soon proved that the tensile strength of wood was no hindrance to the development of an effective pin. In fact, wood has yet to be given a maximum strength test. Slippage always starts first with the fastening device.

The experiments conducted at the university were begun at the School of Mines under the direction of G. R. Spindler. As work progressed, it became more and more of a wood problem. That's when W. H. Reid and C. B. Koch, of the School of Forestry, were called in.

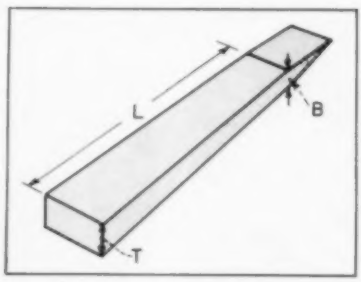
The first problem Reid and Koch faced was developing a device that would simulate a hole in the roof and could be fastened in a universal testing machine.

Many types of wood were tested but hickory was selected as the best species for the job. Hickory has high strength with low compressibility, and exists in considerable quantity.

The objective of the first group of experiments was to determine the relationship between the pin, wedge, hole size and pin displacement. All these factors have a direct bearing on holding capacity.

WEDGE DESIGN

The first series of tests used pins with diameters of 1⅝ in in holes 1¾ and 1⅞ in in diameter. The 1⅞-in holes were discontinued because it was found impossible to insert the wedges without splitting the pins.



The wedges were made of soft maple and shaped as shown in the accompanying illustration. The slope of the wedge was determined by dividing the difference between thicknesses T and B by twice the length, L. The slope was varied by using wedge lengths of 6, 8 and 10 in. About the same penetration was achieved with the 6-in wedge as with the longer ones, since the full length of the 8 and 10-in wedges simply was not used.

The most efficient T dimension was found to be ½ in with a B dimension of 7/16 in on a 6-in wedge. This design gave a maximum average holding capacity of 8,200 lb. Average displacement of the wedge in the hole was 0.130 in. At the present time this appears to provide sufficient strength to withstand roof pressures encountered in tests in the Pittsburgh seam. But because of the wide variance of roof conditions, even within the same coal seam, it cannot be concluded that this combination will hold up all roofs. That much is not yet known about mine roof control.

Furthermore, the first series of tests showed that increases in holding capacity are obtained with greater thickness and slope—at least up to ½ in in T dimension. Over ½ in causes damage to the wood when the pin is being driven. But of the two factors—thickness and slope—statistical analysis shows that the most significant is the effect of thickness.

The second group of experiments used hickory wedges. The T and B measurements were reduced to 7/16 and ⅜-in. Hickory does not compress as easily as maple and a higher holding capacity could be obtained. The hickory pins had diameters of 1⅜, 1½ and 1⅝-in. Hole diameters were ⅛-in greater than pin diameters. Holding capacity ranged from 8,800 lb with the 1⅜-in pins to 9,400 lb with 1⅝-in pins. The range in holding capacity is not statistically different, but is approximately proportional to the variance in contact area of the wedge, the pin and that portion of the hole along which friction is applied.

EFFECTS OF TREATMENT

Treating pins and wedges with 15-lb of creosote per cubic foot resulted in an average holding capacity of 11,100 lb. The average displacement of the pin in the hole was 0.078 in. The pins used in these tests had a diameter of 1⅝ in, and the T and B dimensions were ½ and 7/16 in, respectively.

Definite conclusions cannot be reached yet from any of the preceding tests and it would be premature to say that the time has come for any large-scale use of wood pins. Much work remains to be done.

One of the projects on which preliminary tests have been made is the use of a tapered hole in which it is possible to obtain loads approaching the tensile strength of wood. Early tests using the slot and wedge in a tapered hole have developed loads up to 20,000 lb. Such loads, however, cause excessive displacement.

LOWER FASTENINGS

Further tests are planned to determine the holding capacity of lower fastenings using a slot-and-wedge device. Some wood mine pins in actual use employing such fastenings have apparently worked out well. Other types of lower fastenings also have been used. Most of these, however, are rather elaborate and the cost is greater than the simple slot and wedge. One of these fastenings—basically a lag screw—has performed satisfactorily in actual use.

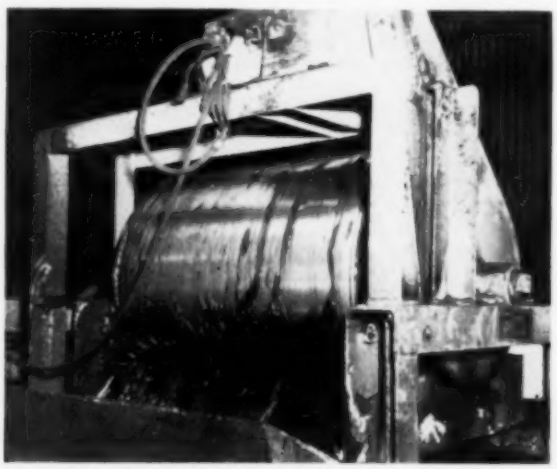
If an efficient wood pin can be developed that utilizes the slot and wedge or some other simple anchor, it will no doubt help to reduce timbering expenses. But a satisfactory wood pin must meet these requirements: it must be inexpensive, easily and quickly installed, available in quantity; and possess the strength required for the job.

It is still too early to determine how valuable the research to date has been. But only one conclusion can be reached at this point—much research remains to be done.

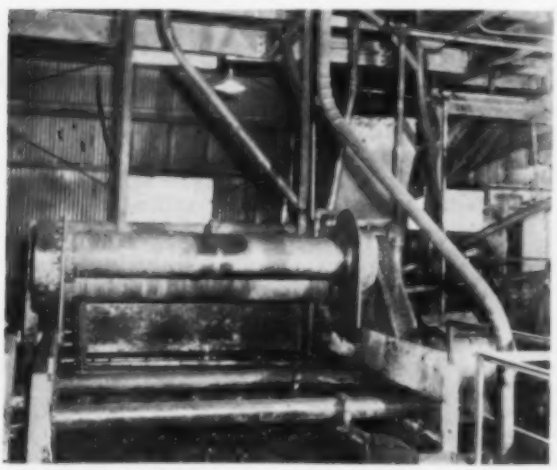
DENSE-MEDIA PLANT processes 250 tph of upper Freeport coal. Clean coal flows to four railroad tracks or to truck bin.

NEW FACILITIES at Seanor Mining include belt slope, precast-concrete storage bin and dense-media cleaning.

CONTROL of preparation plant is centered at pushbutton panelboard mounted on wall near other electrical units.



MAGNETITE RECOVERY for reuse in dense-media washer is achieved with this magnetic separator.



VIBRATING SCREEN receives clean product from dense-media washer and removes magnetite with aid of sprays.

VIBRATING FEEDER transfers coal from underground hopper to slope belt for delivery to cleaning plant.

Seanor Mining Gears For Future...

With new 250-tph preparation plant and belt slope tapping center of unmined reserves. All-belt haulage and 300-kw selenium rectifiers add to mining efficiency at 2,000-tpd mine.

By J. W. HUNT, Associate Professor, and
M. E. ALTIMUS JR., Assistant Professor
Mineral Industries Extension Services
Pennsylvania State University, University Park, Pa.

ADDITION of a 250-tph preparation plant and a belt slope marks another milestone in the development of the modern 2,000-tpd Loyal mine of Seanor Mining Company. Located in Westmoreland County near Saltsburg, Pa., the mine produces coal from the Upper Freeport bed which varies in thickness from 42 to 47 in. Present facilities permit the marketing of clean sized coal by truck or rail via the Turtle Creek Branch of the Pennsylvania R. R.

The mine was opened as a drift in January 1948 in an area where the thicker Pittsburgh bed had been practically exhausted. This provided an immediate local market for the coal during the development stage. The mine was planned to use mobile cutting machines, hand-held electric drills, mobile loaders, and shuttle cars as face equipment and belt conveyors for main-haulage transportation. Preparation facilities include hand-picking, heavy-media washing, screening and bin storage equipment for distribution by truck directly to the consumer or into railroad cars.

NEW BELT SLOPE

The location of the new preparation plant near the center of future production areas and near railroad facilities required the construction of a new portal. The coal seam in this area was 326 ft below the surface and both vertical shaft and slope were considered. Previous experience with belt conveyor transportation led to the decision to use the slope-conveyor system.

The 1,187-ft, 16-deg slope was driven from the surface on a contract basis by Stewart Creasing of Wyoming, Pennsylvania. Little difficulty was encountered in passing through the laminated sandrock strata that formed the cover over the coal. The entire slope was roof bolted with ¾ in Bethlehem expansion-shell bolts with a 6 x 6 x ⅜-in bearing plates, using five bolts per 7 lineal ft. These bolts were set perpendicular to the strata. At the slope entrance and where the strata was weak or faulty, it was lined with Armco 5g lining plates. Each arched section has an inside span of 8 ft 3⅞ in, an inside rise of 6 ft 6¾ in, and a length of 9 ft. Four hundred feet of such lining was used. Each section was back-filled as the work progressed. No timbering was used in any portion of the 1,187-ft-long slope.

A 30-in belt was installed in the slope by company personnel. It is operated by a Westinghouse 125-hp induction motor at a speed of 400 fpm with a 2-step starter.

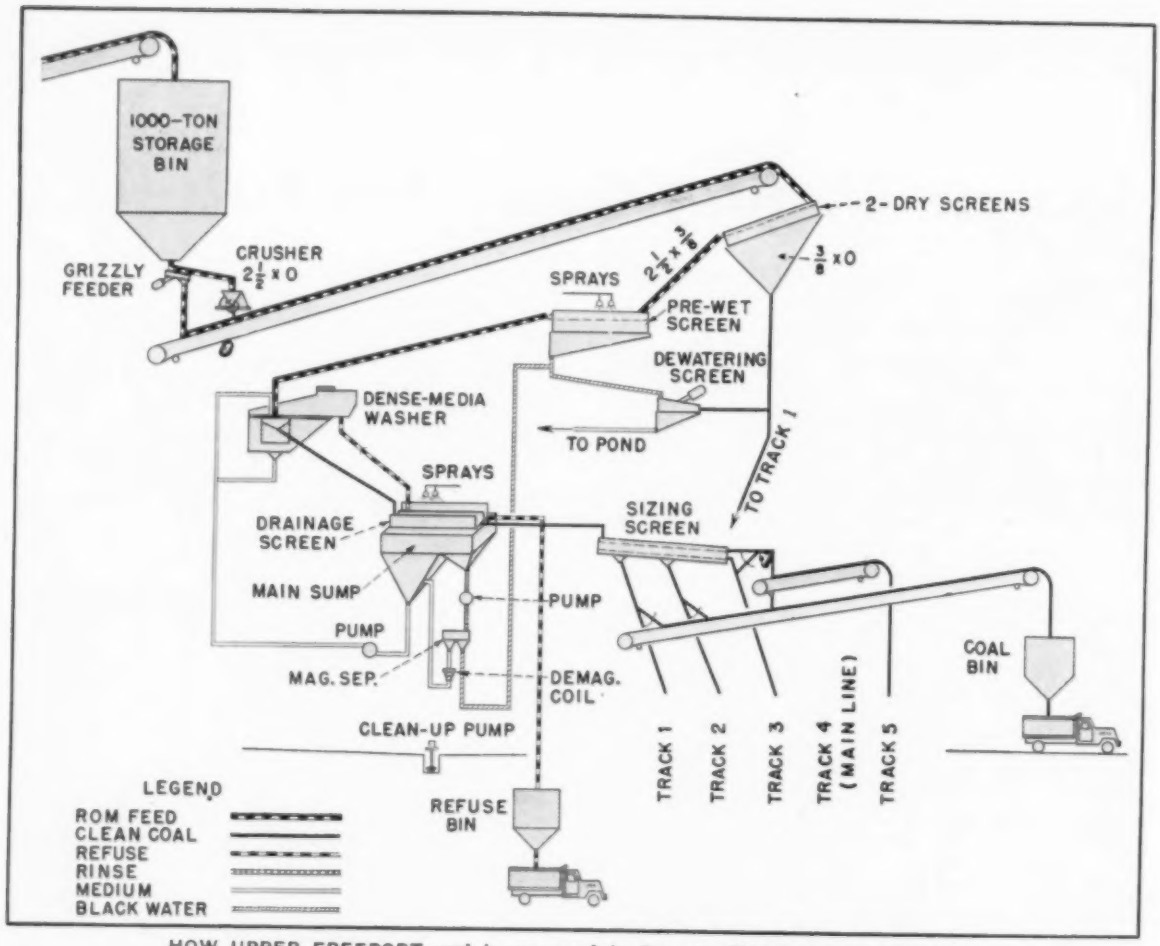
An Ensigneer 1.5-v relay system for safety control is used in the slope. Two bare copper lines stretched on insulators along the entire belt line provide for the stop-start when the wires are brought into contact.

NEW PREPARATION PLANT

The belt discharges into a 1,000-ton circular precast-concrete storage silo produced by Neff and Fry Co., Camden, Ohio. The precast circular sections 2½ ft long, 8 in wide and 2½ in thick were placed into position, tied together with wire hoops, and plastered. This forms a quickly built and economical bin to provide ample storage for plant operation.

The foundation of the silo houses a

TRANSPORTATION of coal from the section to the cleaning plant is over a network of 30-in belt conveyors. Main haulage is 11,000 ft long.



HOW UPPER FREEPORT coal is processed in Seanor's 250-tph dense-media plant.

KEY UNIT in cleaning plant is this dense-media washer handling feed with 10 to 12% reject. Clean coal contains 6.34 to 7.62% ash and 1.22 to 1.52% sulphur.

Williams and Greene 48-in single-roll crusher designed to crush 250 tph to a maximum size of 2½ in. From here a 30-in belt carries the coal to the preparation plant. The 70 x 33-ft corrugated sheet steel structure was designed and built by the Daniels Company Contractors, Inc., of Indiana, Pa.

The raw coal is screened on two Allis Chalmers 5 x 14-ft Ripl Flow units to remove the ⅜ x 0 slack for direct loading into railroad cars or delivery to mixing belts for combining with discharge from the heavy-media cleaning unit. Two Westinghouse 440-v 10-hp motors power these units, using a 3 to 1 belt-drive speed reducer. This equipment is housed in a dustproof section to prevent dust flow into the rest of the plant.

The plus ⅜-in material is fed to a 5 x 12-ft Lecco Vib pre-wet vibrator, powered by a GE 15-hp motor, where the fines are washed off and carried to discharge belt by a Syntron vibrator.

The 2½ x ⅜ material flows into a

Daniels T-50 125-tph dense-media magnetite separator. The discharge flows to a 6 x 16 ft Lecco-Vib vibrating drainage screen. The clean product passes to a 5 ft x 32-in W & G sizing shaker screen which when combined with the ⅜ x 0 permits the loading of five sizes: 2½x0; ¾x2½; ¾x1¼; ⅜x¾; and ⅜x0, in railroad cars and 2½x0 by truck. Calcium chloride is added for drying and freezeproofing prior to loading.

The plant uses 300 gpm of water and requires 50 gpm of make-up water. An adequate supply of water is secured from drilled wells located near the plant. Two ponds located close to the plant provide for water storage and settling. The water circuit is illustrated in the flow sheet.

The plant is controlled by a push-button control unit and operates with a staff of 7 men per shift distributed as follows: 2 men on the slope, 1 at the top and 1 at the bottom; 2 men in main plant; and 3 on cars. Maintenance is handled by 1 man on the third, or non-operating shift.

The plant operates with a 10 to 12% reject and produces coal ranging from 6.34 to 7.62% ash and 1.22 to 1.52% sulphur, depending on the size.

MINING CONDITIONS

The Upper Freeport seam at Seanor lies about 700 ft below the Pittsburgh bed which in the area mined at present has been eroded away. From the outcrop on the eastern edge of the property the seam dips between 2 and 3% to the north and west. The seam thickness varies from 42 to 47 in with 1- to 1½-in slate bands located 12 and 18 in from the bottom. Crushing separates these bands readily from the coal, permitting removal in the heavy-media portion of the cleaning plant.

The roof strata consists of from 2 to 14 in of slate which is held in place with posts and crossbars. Over this is a massive sandstone that generally holds up well without excessive timbering. Some roof bolting has been done in areas where faulty conditions have caused unusual roof support problems.

The mine is unusually free of water and no pumping problems are encountered.

MINING PLAN

The mine was opened by a drift at the outcrop at the eastern end of the property by driving five headings, each 14 ft wide on 60-ft centers on a N 84 deg W course. Crosscuts the same width were driven on 90-ft centers at an angle of 60 deg.

As the development of the Mains continued, three sets of triple butt entries were turned off to the left at an angle of 60 deg, the first at a distance of 2,000 ft and the others at 1,000-ft intervals. These were driven for a distance of 3,000 ft with rooms being turned off 60 deg to the right as the heading advanced and to the left on retreat. The rooms were driven 400 ft long, 30 ft wide on 55-ft centers. Pillars are not mined.

Two butt headings were turned to the right, the first at 1,200 ft and the second at 3,000 ft at the same angles. Number 1 Butt Left was driven to the outcrop for drainage and rooms turned off on the right side only because of bad roof conditions. The second butt was driven for a distance of 1,700 ft and short rooms turned to the right and left. The same poor roof conditions prevented full scale operations.

The main entry was expanded into a six-heading system at a distance of 2,800 ft and continued as such except where faulty conditions were encountered. At a point approximately 5,000 ft along the main entry, South Mains was turned off at an angle of 70 deg to tap the areas in the southern portion of the property. South Mains was extended as a six-heading system for a distance of 5,000 ft. Three butt headings were turned off to the right on 1,000-ft centers at an angle of 70 deg and extended for a distance of 1,500 ft and rooms developed according to the previously described plan. North Mains was turned to the right at an angle of 80 deg at the same point as South Mains. This was driven as a five-heading system for a distance of 2,500 ft and remained undeveloped at this time.

To reach the coal reserves in the south and southeast areas, East Mains was turned off South Mains at a distance of 3,000 ft at angle of 55 deg to the left and driven for a distance of 2,600 ft and then turned left at an angle of 25 deg to the property 3,000 ft distant.

Five butt headings were turned to the right off East Mains with rooms developed on both sides in the same pattern as before described. Headings 4 and 5 Right are producing at the present time.

To pick up the coal beyond the reach of the main entry butts, No. 1 Butt Left was turned at 90 deg and driven 3,000 ft. Rooms to the right and left were developed from this entry.

Faulty conditions were encountered in the heading and in 2 and 3 Left. The headings were driven through the fault, but the butts were stopped. This coal boyond the fault will be mined from 4 Left which has been driven and now, together with the face of East Mains, forms the other active producing area.

The main headings were stopped after being driven a total distance of 7,000 ft. At a distance of 1,000 ft inby South Mains an angle heading or Slope Heading was turned off to the left to intersect South Mains, and to the right in line with the bottom of the then proposed slope. This provided the location for the slope heading belt previously described.

Future development will lie in the northern section of the mine in the general vicinity of the slope. Ample reserves are available for future development.

HOW COAL IS MINED

Face equipment consists of seven Joy 14-BU loading machines; three 11-RU cutting machines; nine shuttle cars, including Joy, Jeffrey, and Lee-Norse units; and four CB-572 Schroeder hydraulic drills. Kennametal cutting bits and augers are used throughout the mine.

Coal is produced from three working sections using 1 drill, 1 cutting machine, 1 shuttle car in headings and 2 shuttle cars in rooms. The face crew consists of 10 men: 3 shuttle car operators, 2 loading machine operators and 1 helper, 2 cutters, 1 shot firer, and 1 utility man. Each section has a certified mine foreman as a face boss on each of the two producing shifts. The loader crews take care of timbering and rock dusting on each shift. Rooms are driven to a maximum distance of 400 ft, thus limiting the shuttle car haulage to a maximum of 460 ft.

OPERATING CYCLE

The faces are drilled by handheld hydraulic drills equipped with a 9-ft Kennametal auger and carbide insert bits. Undercutting is done by a rubber-tired 11-RU cutting machine to a depth of 8½ ft in rooms, entries and cross-cuts. In the latter shearing to the same depth is also done 4 ft from the right rib. Each hole is charged with 3 sticks of 1¼ x 8-in permissible explosive and fired by a certified shot firer.

Crawler-mounted 14-BU units load the coal into cable-reel shuttle cars that discharge directly onto the 30-in butt-entry belts. Rock and slate that may be taken down is gobbed in the mine.

BELT HAULAGE

Each panel butt heading is equipped with a 30-in belt conveyor upon which the shuttle cars dump

DIRECT CURRENT switchgear for selenium rectifier is inspected by William L. Seanor Jr., one of the six partners.

ALTERNATING CURRENT switchgear for selenium rectifier fits compactly into steel cabinet.

Easily moved 300-kw selenium rectifiers

directly. The 5-Right belt head is typical of the other installations. This unit is a Joy MBT-30 unit using a Cleveland Gear Co. Speedair drive with a 12 to 1 reduction ratio, and powered by a Reliance 40-hp motor. It is equipped with an automatic stopping switch to prevent spillage in the event of a clogged discharge chute. The unit was designed and built by Kenneth Ruffner, plant chief electrician. These belts are reversed for the delivery of supplies and men to the working sections.

Main line haulage consists of 11,000 feet of 30-in belt. The main heading belts are operated by DC mine power using Huwood-Irwin, Jeffrey, and Scottdale driving heads of 50, 40, and 30 hp respectively. An attendant at the point of discharge of the butt panel belts controls the operation. He is in contact with the slope bottom and preparation plant by telephone.

The 1,850-ft slope heading belt is powered by a 60-hp Westinghouse AC motor and controlled by an operator at the bottom of the slope. All of the belts may be stopped at any point along the belt line by merely touching the two bare wires of the Ensigneer control.

ROOF CONTROL

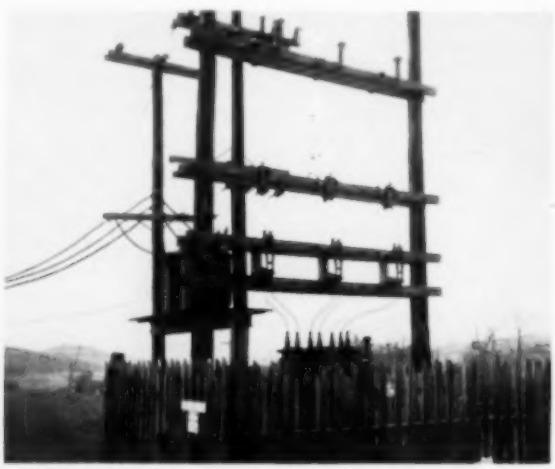
The control of the roof does not present any special problems in the areas now being worked except in faulted areas. The belt headings are brushed to maintain the required 48 in of clearance and timbered with a double row of permanent posts set on each side of the belt on 4-ft centers. In the entries and crosscuts no permanent timbers are set although during the mining operation safety posts are maintained to within six feet of the face.

In rooms a shuttle-car runway, 14 ft wide, is maintained on the left side and posts set on 4-ft centers toward the right rib. Some roof-bolting has been done in faulty areas but not on an extensive scale except in the slope.

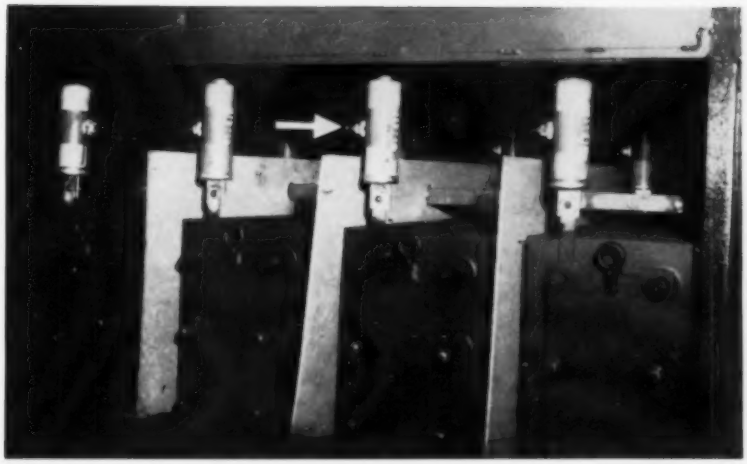
MAINTENANCE AND SERVICE

Each of the two productive shifts has one maintenance man on duty for the entire mine. Seven men, employed on the non-productive shifts, take care of lubrication and general

SUBSTATION installation at borehole includes transformers and portable steel building housing rectifier.



VOLTAGE REGULATION for selenium rectifiers is achieved with induction unit like this or autotransformer.



SELENIUM STACKS with cooling fins are fitted with readily accessible fuses. Neon light (arrow) shows when fuse is blown.

provide trouble-free mine power

repair work inside the mine. A similar man is employed for the preparation plant maintenance. The work is co-ordinated by the chief electrician.

Supplies are delivered underground over 1½ mi of track to the junction of East Mains. From here the supplies travel by belt to the face areas. Plans have been made to extend this supply track as expansion progresses.

VENTILATION

An exhaust system of ventilation is maintained with a 5-ft, 100-hp Joy Axivane fan placed in the No. 4 heading of the original portal. It provides 81,000 cfm of air for seven ventilating splits. Five inactive splits receive from 3,000 to 5,000 cfm while the two active splits receive 30,000 and 24,000 cfm respectively.

Stoppings are built of 6 x 8 x 16-in concrete blocks which are plastered to give a better seal in main entries. This type of construction has provided ample strength for conditions encountered to date. Cloth brattice are used for curtains and checks and for directing the air to the working face. For the inactive splits, corrugated metal tubing is used for bridging air instead of overcasts.

With further expansion it will be necessary to revamp the ventilation system. This will require either a larger or an additional fan placed in closer proximity to the development area.

SELENIUM RECTIFIERS

The West Penn Power Company delivers 6,900 v to the doorstep of each of three selenium rectifier substations employed by the coal company. However, the 6,900 v is reduced to 240 v by three General Electric transformers before it is purchased by the mining company.

A General Electric induction voltage regulator is employed at one of the two main selenium rectifier stations. An autotransformer-type voltage regulator is employed at the other. The third rectifier recently installed to handle the locomotive haulage demand depends solely upon the inherent voltage regulation of the selenium rectifier.

The feeder-voltage-type induction regulator is controlled by the DC load demands which alters the phase relationship of the induced voltage so that the voltage on the high-voltage (6,900 v) side of the transformer is increased or decreased automatically to maintain the required output voltage of the rectifier.

The DC mine power requirement of approximately 1,000 hp places an average of 580 kw demand upon the three rectifiers on a working shift. The two production section rectifiers which are coupled in parallel carry approximately 230 kw and 280 kw respectively. While the third, or locomotive haulage, rectifier handles very little of the present DC demand, the plans in the future call for the development of the slope heading section which will require its maximum power output.

The two production section rectifiers were manufactured by the Syntron Co. of Homer City, Pa., while the third unit was assembled by H. E. Jones for the mining company, although the selenium stacks were also purchased from Syntron Co.

The rectifier consists essentially of eight stacks of assembled selenium rectifier plates and ITE AC and DC switch gear. As illustrated in the figures the plates contain cooling fins which to date have provided ample cooling with the natural connection currents through the chimney-like enclosures of the set. The switch gear consists chiefly of overload and thermal protection units. No feedback protection is provided.

Series and parallel arrangement of the plates were designed to give the rectifier a rated capacity of 300 kw and to develop approximately 300 v DC.

The company-assembled unit has an enclosure equipped with an access door for rapid replacement of fuses. Each fuse is paralleled by a small neon light which illuminates whenever a fuse is blown.

Since the introduction of the selenium rectifiers in 1952, only one failure of an individual stack has been experienced. Records show several abnormal overloads on the production rectifier stations with no reduction in service.

The management is very pleased with the service provided by the selenium rectifiers and point to the ease of transporting each station as a complete unit, stacks and switch gear, as a distinct advantage to them. The weight of the entire set is only 6,500 lb and measures 12x6x8 which makes it possible to load on a medium-sized truck for transporting. Spring-mounted stacks within the enclosure prevents damage to the plates whenever set is placed in a twist during the transportation procedure.

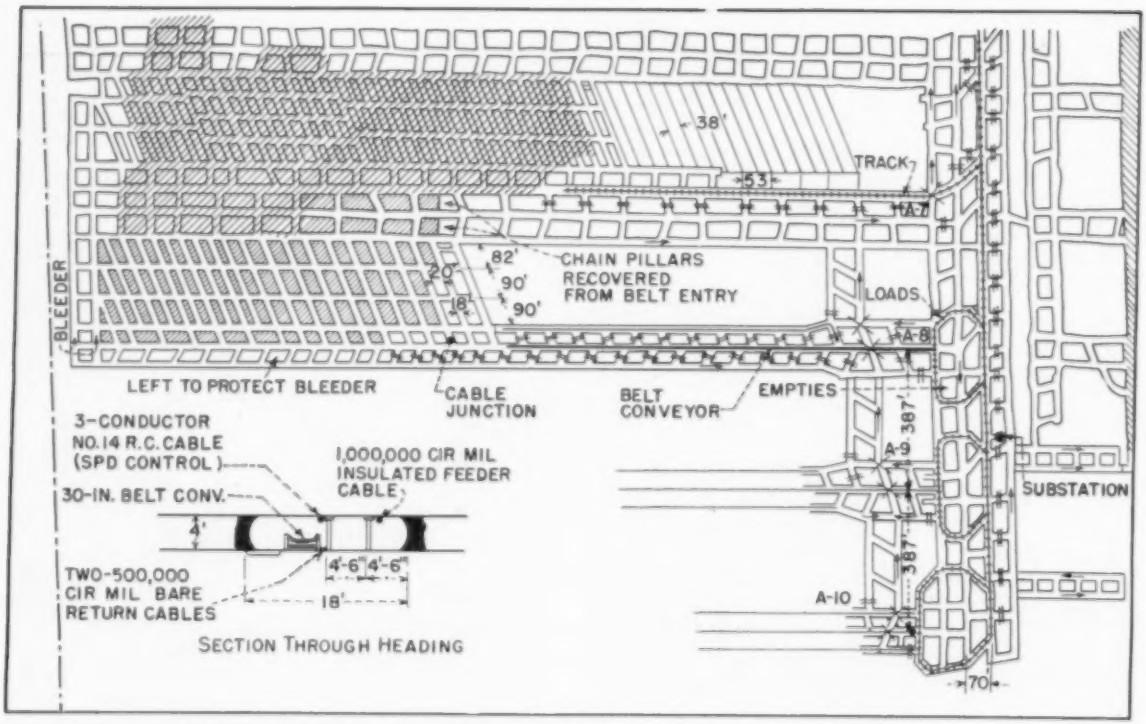
Normal suspension methods are used to hold the power and return cables in the boreholes. The average depth of the 8-in churn-drilled borehole is approximately 200 ft. One million circular-mil copper insulated cable is used for the positive and return lines. Aluminum cable is now being purchased for return line circuits. Joy safety circuit centers are used to direct and control DC power equipment in each section.

MANAGEMENT

The active management of the mine, with a total of 130 employees, is handled by the six partners, W. H. Seanor, Sr., W. H. Seanor, Jr., J. H. Seanor, A. L. Seanor, E. E. Seanor, and Marcus Seanor. Rudolph Helfer and Kenneth Ruffner are the mine foreman and chief electrician, respectively. Mr. W. R. Richards, professional engineer, Greensburg, Pa., is the mining engineer.

CONTINUOUS MINER boosts mining efficiency and recovers a greater percentage of available coal at Eastern Gas and Fuel Associates', Sonman mine. Mining is in the 48-in Upper Freeport seam near Portage, Pa.

Improving Mining Efficiency With



HOW CONTINUOUS MINING SECTIONS are laid out and worked at Sonman mine.

PICKUP LOADER follows continuous miner as it bores into coal. Unit discharges coal into shuttle cars for delivery to loading stations. Special digging arms enable loader to pick up fines faster and thus speed loading.

Continuous Miners

APPLYING NEW METHODS to boost mining efficiency is a continuing policy at Eastern Gas and Fuel Associates' Sonman mine. Latest equipment additions in this continuing program of mine improvements are continuous miners and belt conveyors. These modern machines are keys to successful operation of a mine 40 yr old.

Top benefits credited to continuous mining include greater safety for face workers because of improved roof conditions; recovery of at least 10% more of the available coal; and a raw product that can be washed easier.

In 1936, Sonman was a hand-loading mine with mule haulage. Since then, the company has in turn used such equipment as chain and shaker conveyors, and crawler-mounted loaders and shuttle cars. Today, about 55% of Sonman's output is produced by three Jeffrey 76AM Colmols and the remainder by Joy 14-BU loaders and shuttle cars.

MINING CONDITIONS

Sonman mine is located about 1 mi north of Portage, Pa. Mining is in the Upper Freeport, or E, seam which has an average thickness of about 48 in. There is a 2- to 3-in layer of rock about 12 in from the bottom of the seam. This impurity varies from medium hard to hard but does not interfere with successful operation of the continuous miners. At times the coal is cut by clay veins; however, the continuous miners cut through them without too much trouble. Even with these impurities in the seam, bit cost averages less than 2¢ per ton. The seam is underlain by fireclay and dips 5 to 15% to the southwest, with some local dips and swags.

MANAGER, Eastern Gas and Fuel Associates', northern mines is W. J. B. Mayo.

The areas where the continuous miners work are under 500 to 800 ft of cover. Included in the overlying strata are shales, limestone and sandstones. At times the immediate roof is a weak sandstone which must be supported very closely. In other instances, there is 6 to 10 in of rooster coal above the coal. This material is roof bolted to the rock as mining advances but frequently must be taken down later.

CONTINUOUS MINING BENEFITS

Aside from increasing mining efficiency, the continuous miners have produced a number of other benefits. For example, the rock parting near the bottom of the seam now is broken out in sizes that are large enough to be sent to the calcium-chloride washer. When coal is blasted and picked up by a conventional loader, the impurity is broken much finer by gathering arms and about 50% of it is smaller than ½ in. This finer ½x0 impurity went to the air tables which could not perform as efficiently with the heavy concentration and cleaning units can therefore do a better job.

Another benefit credited to continuous miners is the elimination of the need of handling draw rock and rooster coal with the seam. In areas where there is no rooster coal above the seam, 4 to 7 in of top rock usually

ROOF BOLTING with this compact unit follows coal extraction as closely as possible. Two men install 100 bolts per shift.

LOADING STATION in belt panel is chain conveyor unit that permits fast unloading of shuttle cars and provides even belt loading.

Belt Smooths Panel Haulage

BELT CONVEYOR in room entry discharges coal into mine cars in panel entry. Hand-operated fly gate permits continuous loading without spillage.

MAGNETIC STARTER with speed control permits easy varying of belt speed.

breaks loose with the coal when conventional mining equipment is used. When continuous miners work in similar areas, the top can be supported with straight props on 5-ft centers.

Where rooster coal is present and conventional methods are used, it comes with the coal and must be loaded. When continuous miners are used in similar areas, the rooster coal remains in place and can be secured with roof bolts.

Since continuous miners work only in one place at a time and roof conditions are generally better than in areas where conventional units are used, Sonman is able to recover up to 10% more of the available coal. By concentrating work in one place and thus exposing a minimum of roof area, the company keeps roof problems to a minimum. The roof also is not disturbed by blasting. The company reports that the rate of extraction is so rapid that roof pressure does not develop in the working area.

Another important benefit of continuous mining is that men work under comparatively safe roof. With conventional methods about 50% of the accidents from roof falls occurred in areas with draw rock. The company reports that to date no men have been injured by roof falls in continuous mining sections.

Sonman mine was developed by driving main headings down the dip. Room entries are driven on the strike and rooms are driven uphill 60 deg with the room entry. Thus room haulage always is in favor of the loads.

ENTRY DEVELOPMENT

Sonman develops both panel and room entries with continuous miners. Panel entries are developed with four headings on 70-ft centers. As these headings are driven, room panels are

necked on 387-ft centers and developed deep enough to permit 200 ft of belt conveyor to be installed while the previous panel is being mined. A pair of line rooms also is driven to connect the room entries to provide passages for new air splits. Development in coal is carried out on a two-shift basis and bottom is lifted on the third shift to provide clearance for track haulage.

When room-entry development reaches a point inby the barrier pillar, the heading centers are narrowed down to 50 ft to form smaller chain pillars which can be extracted rapidly. This also reduces the length of shuttle car haul. Breakthroughs in belt panels are cut 60 deg with the middle headings on 83-ft centers to correspond to alternate room centers. The No. 3 or right heading is the track heading where shuttle cars discharge directly into mine cars. A sidetrack is laid out in the track heading 1,000 ft from the mouth of the room entry to permit speedy trip changes. Designed to hold a full trip of 12 cars, the sidetracks are 200 ft long. Cars are handled at the loading ramp by a hoist with 300 ft of wire rope.

Panel belts are 30-in units that extend a maximum of 2,000 ft to the panel limit. Belts are powered by 40-hp 250-v DC motors driving a speedreducer. Belt speed can be varied from 235 to 350 fpm by a control on the magnetic starter. All belt extensions are made on a third shift when 200 ft of conveyor is added. Two extensions are made after six work shifts and the third after four. This cycle is repeated every three extensions to keep the belt as close as possible to the face, thereby keeping shuttle car hauls to a minimum.

Belt protection is provided by a single-roller centrifugal switch. This device is designed to interrupt the flow of current to the belt drive if the belt should stop while the drive is still running. As soon as the belt stops a contact drops out and the electrical circuit is broken. Thus the belt drive stops almost instantaneously and danger of a belt fire or damage to the belt is minimized.

To permit fast unloading of shuttle cars and even loading of the panel belt, a belt loader is used. The chain conveyor unit is 26 ft long, 38½ in high and is skid mounted for easy moving.

OUTSTANDING SAFETY RECORD at Sonman in 1955 resulted in mine winning two coveted awards. J. R. Irvin (left), superintendent, presents the Joseph A. Holmes Safety Association certificate of honor to G. V. Jones, mine foreman. Mr. Jones (right photo) admires Eastern Gas and Fuel Associates president's plaque, awarded to Sonman for having the best record in accident prevention in the company's coal division.

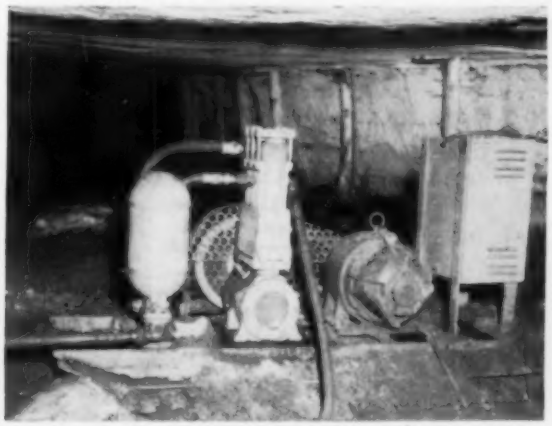
ROOMING AND PILLARING

After a room entry is developed to its limit and bleeders established, the continuous miner starts room and pillar work next to the bleeder. Rooms are numbered consecutively from the panel limit to the mouth of the entry.

Rooms are driven 18 ft wide on 38-ft centers and 60 deg with the headings. The 18-ft opening is made by taking two passes with the continuous miner. Alternating from side to side, the continuous miner advances a maximum of 20 ft before moving to the opposite side. This is done to permit roof bolts to be installed as quickly as possible after coal is removed.

Here's how rooms are developed. The No. 1 room is advanced 91 ft to the first breakthrough. The continuous miner alternates from side to side as in driving headings. Then the machine is trammed out and the No. 2

POWER CENTER provides safe, convenient connections for trailing cables carrying power to face equipment.



HIGH PRESSURE PUMP provides constant supply of water to continuous miner sprays for allaying dust at the face.

CONFERENCE at Sonman includes J. B. McCarty (left), safety and ventilation engineer; J. R. Irvin, superintendent; G. V. Jones, mine foreman; T. E. Jones, Pennsylvania state mine inspector; and E. B. Turbridy, resident engineer.

room is driven as far as the first breakthrough, and the two rooms are connected. The machine then moves back to the face of No. 2 room and advances far enough for the second breakthrough. After the second crosscut is driven, the machine returns to No. 1 and completes it. Next, No. 2 room is cut through.

Before pillar extraction begins, No. 3 room is driven and crosscuts made to No. 2 room. To save tramming time, in moving the machine to No. 2 to start pillar work, a passage is cut through the last inby pillar between Nos. 2 and 3 rooms. Thus the Colmol holes through near the face of No. 2 room, ready to attack the first room pillar. The miner trailing cable is pulled through the pillar and down No. 2 room to the power center by a shuttle car. This takes about 20 min, which is considerably less than required to tram the machine out of No. 3 and into the face of No. 2.

A row of four safety timbers is set at the face of the room before the pillar is attacked. As the continuous miner eats into the pillar open ended, a row of timbers is set along the gob side. Pillars are 20 ft thick and can be removed without the machine operator being in the pillar area. Since extraction is very rapid and roof does not have time to deteriorate, pillars can be extracted cleanly. Thus percentage of recovery is very high.

When the shuttle cars serving the continuous miner discharge coal into mine cars instead of onto a belt conveyor a haul road is driven parallel to the track heading. This is kept advanced a maximum of 300 ft outby the last room. As more rooms are driven the haulway also is extended.

Operating Officials

H. John Harper, Vice President, Operations
A. P. Boxley, Production Manager
Stephen Krickovic, Chief Engineer
W. J. B. Mayo, Manager, Northern Division
J. R. Irvin, Superintendent
C. G. Smith, Chief Electrician
G. V. Jones, Mine Foreman

When track haulage is used in the panel, 18-ft stumps are left in room pillars to protect 150 ft of track inby the loading point. When a loading ramp is moved, room stumps are recovered to a point within 150 ft of the new loading station. Since bottom is lifted to provide clearance for track haulage, the two rows of chain pillars are left in and recovered from the next room entry.

When belt haulage is used in the room entry, extraction of room stumps and chain pillars is tied in with shortening of the conveyor. Belt is recovered in 200 ft sections; thus the chain pillars are recovered within a 200 ft distance each time the conveyor is shortened.

The continuous miner advances an average of 94 ft per shift and output ranges from 200 to 280 tons per shift. A room is driven and the pillar extracted in five shifts.

As the continuous miner bores into the coal it discharges coal onto the floor. A Joy 14-BU loader follows and picks the coal up and delivers it to two 5 SC shuttle cars that carry it either to a belt conveyor or to mine cars. Special plates have been added to the gathering arms of the loaders to enable them to pick up the fine coal faster and thus speed the loading.

Section crews in entry development include 1 Colmol operator, 1 14-BU pickup loader operator, 2 shuttle car operators, 2 roof bolters and 1 foreman. In room and pillar work the crews are the same with the exception of 1 timberman being used in place of 2 roof bolters. If roof bolting is required in rooms or pillars, crews are the same as in entry work.

ROOF BOLTING

In areas where rooster coal overlies the seam, roof is supported by 36-in expansion-shell-type bolts. These are installed as quickly as possible after the coal is removed. In entry development a 2-man crew uses a roof bolt drill to set bolts on 4-ft centers. The men follow a standard procedure in setting bolts, installing bolts after the Colmol advances 20 ft. Here's how they do it.

The continuous miner advances along the left side of the heading. As it moves back to start the second path along the right side, the bolting crew follows the miner out from the face and sets a row of steel safety jacks in the center of the place. Bolts are then set on 4-ft centers in a row 7 ft from the left rib and between the row of jacks and the continuous miner. After reaching the face, the crew turns around and works outward from the face, setting another row of bolts 3 ft from the left rib.

After the continuous miner completes the 20-ft advance on the right side, the bolting crew sets safety jacks as before and moves to the face and works outward, setting a row of bolts 4 ft from those previously set on the left. After these are installed, the men turn around and work toward the face, installing bolts 3 ft from the right rib. Thus they complete work at the face and are in position to move into the newly driven passage on the left when the continuous miner trams out. A bolting crew sets an average of 100 bolts per shift.

Roof bolts in rooms are recovered as pillars are extracted. If the continuous miner is working a pillar to the left of a room, a timberman sets three safety timbers close to three of the four bolts in the row opposite the pillar lift. These bolts are recovered with the aid of a hand wrench. The fourth bolt is recovered after the continuous miner pulls out and a safety timber is set near the bolt. It takes an average of 1½ min to recover a bolt. When four bolts are recovered, they are tied together and hauled to the loading point where they are stored for later use.

Dos and Donts . . . In Handling Lubricants

By ERNEST W. FAIR

LUBRICATION REQUIREMENTS of modern mining machines, with their high speeds, high loads and close tolerances, are becoming increasingly severe. In addition the improved properties of premium grade lubricants, which have been secured by the addition of small quantities of selective additives, require greater care in handling, storage and usage than ever before. These additives are present in very delicate balance. If this balance is disturbed to even the smallest extent the properties of the lubricant become impaired.

These new developments make it essential that every type of modern lubricant used in the mining operation be handled with the utmost care today. And this is just as important whether the mine be small or large and whether the amount of lubricant stored be a single can or a hundred drums.

UNLOADING AND STORAGE

Proper care begins with attention to unloading, particularly of large drums. Transfer direct to a loading platform is best. Should there be none it is important that a ramp be used and the drums slid endwise to the lower level. Drums should never be dropped, even to a cushion, for the seals can be split and leakage will occur.

Where distances are very short drums can be transferred by rolling, but where distances are long it is much better to use hand trucks, lift trucks or other conveyance to avoid any strain on the seams.

It is also important that lubricants be stored in a central location so that there will be no more than ordinary handling of containers, i. e., the shorter the distance the less chance for damage to the container. The storage area also should be one free of dust and vapors or other possible forms of contamination. Storage indoors is always preferable. However, in some instances, outdoor storage, of large drums in particular, is necessary. Under these circumstances they should be placed on their sides and on racks, but never laid on the ground. The old practice of setting them upright on end results in accumulation of rain water which is sucked into the drums by normal breathing actions.

FIRE PREVENTION

It is, of course, best to store all lubricants in a fireproof station. Brick, tile or concrete walls are preferable and floors should be of the same materials, as well as fitted with suitable drains. Woodwork, in addition to being a fire hazard in connection with lubricant storage and handling, is very difficult to keep clean.

Cleanliness is too often neglected in such storage. The average workman feels that the containers in which the lubricants are housed are sturdy, safe and secure and that nothing can enter them. This is true to some extent but not to perfection for extensive studies have shown that in addition to the aforementioned disturbance of chemical balance such contamination is possible in even the finest of modern lubricant containers. Where such storage areas are kept painted in light colors we are providing an added protection.

It has also been found that regardless of the volume of such storage, it is always advisable to keep different brands and types of lubricants stored separately and in their proper places. An error in use of any given lubricant may cause very serious damage to the machine upon which the wrong lubricant is applied in any mine operation today, so specialized have lubricant requirements become.

It also is inadvisable to order lubricants in too large quantities today. Available discounts for large quantity purchases have become smaller and smaller and seldom justify the possible hazard involved in taking care of large amounts of stored lubricants. There is also the danger of ineffectiveness brought about through changes in their delicate chemical balance over a long period of time.

Direct heat should never be applied to any lubricant container when it is necessary to transfer from a cold storage area to the point of use. Such direct heat melts the sealing compounds on drums and results not only in leakage, but in possible harm to the product. Best procedure is to make the transfer sufficiently ahead of time to allow room temperatures within the building to do the job slowly and safely.

It is also to be noted that exposures to temperature extremes can damage modern lubricants. It is far better to discard a lubricant that has been subjected to such temperature extremes than to risk its use on equipment.

LUBRICANT APPLICATION

Much loss of lubricant efficiency is often brought about in actual use. Any and all equipment that is to be used in transferring a lubricant from its container to the point of lubrication should be kept clean and it is advisable to clean the equipment before usage. It takes very little dust—so little it is hard to see with the eye—to contaminate any lubricant with resultant unnecessary wear.

It is also advisable to keep very accurate records on lubricant use and to date containers where any appreciable amount of stock is kept in storage to make certain that the oldest lubricants are always used first.

We must also be on constant guard against employee lapses in lubricant application. Wherever possible it is best to centralize such work in the hands of one or more individuals who have been given proper instruction in their handling and application and who also have been trained in the extreme importance of using the proper lubricant for each particular machine spot.

The idea that "oil is oil" and one lubricant much the same as another has no place in our modern mining operations. Mixing types and brands indiscriminately can often cause as much damage to delicate equipment as the use of improper lubricants in the first place. It will pay any mine management to make certain that supervisory personnel have impressed on every machine operator that there is a specific and definite lubricant for his machine and NO OTHER.

Finally, there should also be a constant guard against contamination of lubricants through any means or method. In the past, for example, water contamination could be handled by allowing the moisture to settle to the bottom of the container. Today, with the use of so many additives, this has changed. Many of these additives are water-sensitive and some may be removed partially or completely by contact with only a trace of water.

OPENING SESSION—Julian D. Conover, (left), executive vice president and secretary, AMC; E. B. Agee, Indiana Coal Operators Assn., chairman, floor committee; Howard I. Young, American Zinc, Lead & Smelting Co., president, AMC; G. A. Shoemaker, Pittsburgh Consolidation Coal Co., national chairman, program committee; R. E. Salvati, Island Creek Coal Co.; W. W. Patchell, Pennsylvania R. R.; Hon. John P. Saylor, U. S. Representative, Pennsylvania.

STRIP MINING—Fred Bramer (left), Enos Coal Mining Co., E. R. Phelps, Pittsburg & Midway Coal Mining Co., floor committeeman; G. H. Utterback, United Electric Coal Cos., chairman; James Hyslop, Hanna Coal Co.; A. F. Busick, Marion Power Shovel Co.; William W. Youngblood, Midland Electric Coal Corp.; W. C. Spencer, Pittsburg & Midway Coal Mining Co.

MAINTENANCE—R. R. Williams (left), Colorado Fuel & Iron Corp., chairman; Donald B. Shupe, Eastern Gas & Fuel Associates; S. P. Carter, Coal Div. Armco Steel Corp.; Robert E. Havener, Mine Safety Appliances Co.; B. R. Walburn, Vesta-Shannopin Div. Jones & Laughlin Steel Corp.; C. E. Lawall, Chesapeake & Ohio Ry., floor committeeman.

Coal Mining Today

Outlook...Production...Preparation...Safety

As Highlighted at the 1956 Coal Convention

American Mining Congress

GROWING APPRECIATION of the possibilities for future growth was accompanied by increased stress on ways and means of solving coal's production, preparation and safety problems at the 1956 Coal Convention of the American Mining Congress, May 7-9. Thus, predictions of growing markets at home and abroad were accompanied by numerous and detailed presentations on achieving lower cost, higher quality and greater safety in ten technical sessions devoted to all phases of stripping, continuous mining, coal preparation, industrial engineering, roof support, and haulage and power.

INDUSTRY MEETING—
A Special COAL AGE
Staff-Written Report

Industry Cooperation

Better teamwork and coordination between all segments of the coal industry are vital to coal's future, G. A. Shoemaker declared in opening the convention.

Mr. Shoemaker, vice president, Pittsburgh Consolidation Coal Co., emphasized that the coal industry had reached the limit of its present mine and transportation capacity. To realize its future, therefore, coal must give priority attention to opening new and replacing exhausted mines, developing alternate methods of transport, and establishing a better working relationship with the railroads.

No less important to the industry's future will be new and improved machinery, more prudent marketing, more efficient production, a closer alliance between the producer and consumer, and a greater concentration of capital in the hands of fewer companies.

Planning Ahead

Coal must be alert to its needs and creative in its thinking if the industry is to provide the Nation's future requirements for electric power, steel, and other industrial expansion, declared Raymond E. Salvati, president, Island Creek Coal Co., Huntington, W. Va.

Billions of dollars will have to be spent before 1960 to expand capacity. To provide funds for this expansion profits must be assured through greater production efficiency and constant cooperation with equipment manufacturers to reduce mining costs.

Mr. Salvati described the export market as "more stable than at any other time. It should continue with us for many years to come." But, he added, the industry must get together and solve rail and ocean freight problems if the export market is to be preserved and developed.

The coal executive called on his industry to do something that will encourage young engineers to take up coal careers. There is a "bait" task ahead which engineers now in the industry must perform.

Rails and Coal

To meet the coal industry's expected 250-million-ton production increase by 1970, American railroads will have to spend $1.2 billion (1956 prices) for 118,000 more hopper cars and necessary added locomotives. Of this amount, Mr. Walter W. Patchell, vice president, research and development, Pennsylvania R.R., said his company would normally finance one-sixth, or $200 million.

The money for expanding coal transportation facilities must come from earnings realized through Pennsylvania's coal traffic, plus borrowings backed by expected earnings from that new equipment. "In other words, the coal side of our business, should finance its own future, rather than look to any other activities to do the job."

Coal and Congress

There is a national danger in a mobilization program that does not provide for the needs of a vigorous expanding coal industry, warned Hon. John P. Saylor, U. S. representative from Pennsylvania. A cure must be undertaken as soon as possible with unity and determination.

Mr. Saylor said he hoped that H. R. 400, being sponsored by him, would result in a research program on the same level as those now enjoyed by the Atomic Energy Commission, The National Advisory Committee for Aeronautics and the National Science Foundation.

While H. R. 400 may eventually solve coal's research needs, he urged the industry not to lessen its efforts to obtain other governmental and legislative aid for combatting competition from oil, natural gas and atomic energy.

Utility Coal

Coal will still be the top source of energy for electric power in 1975, Philip Sporn, president, American Gas & Electric Service Corp., New York, declared at the Monday luncheon meeting.

Mr. Sporn estimates that the United States will need 2,000 billion kwhr of electric power in 1975, compared with 550 billion kwhr last year. Of the 1975 need, coal should supply 65%, hydroelectric 12.5%, natural gas 10%, oil 5%, and atomic energy, 7.5%. Coal requirements for power should thus reach 488 million tons or three and one-half times 1955 consumption.

The progress of nuclear power is not as dramatic as generally thought. Obstacles will be overcome but only after painstaking research and engineering achievement.

Strip Mining

"Operating 57% of the time in April, the 60-yd shovel moved 1,120,000 cu yd—a monthly rate well over 2,000,000 cu yd."

The performance of the 60-yd shovel has been more than satisfactory, emphasized James Hyslop, president, Hanna Coal Co., Div. Pittsburgh Consolidation Coal Co., St. Clairsville, Ohio, in a description of its engineering development and economics. Leading off the Monday afternoon strip mining session, of which G. H. Utterback, secretary-treasurer, United Electric Coal Cos., Chicago, was chairman, Mr. Hyslop added:

"We are now sure that it is feasible to operate a dipper of this size and that it can be filled consistently if adequate power is applied and if the geometry of the digging elements is correct.

"The question of maximum dipper size has not yet been settled. But indications are strong that a dipper of 70 cu yd capacity could also be made to perform satisfactorily if it were attached to a machine of proper design, and applied to overburden of sufficient thickness."

During the month of February, the "Mountaineer" moved 1,080,000 cu yd under highly adverse operating conditions. And, working 57% of the time in April, it moved 1,120,000 cu yd. This is a monthly rate well over 2,000,000 cu yd.

HAULAGE AND POWER—V. D. Picklesimer (left) South East Coal Co., chairman; J. L. Thornton, Goodyear Tire & Rubber Co.; J. H. Nash, Ensign Electric & Mfg. Co.; S. P. Polack, USBM; W. R. Morton, General Electric Co.; F. R. Sell, West Penn Power Co.; C. B. Peck, Anaconda Wire & Cable Co.; Stanlee Hampton, Tennessee Consolidated Coal Co., floor committeeman.

COAL PREPARATION—W. W. Everett (left), Glen Alden Corp., chairman; Matthew Turkovich, Island Creek Coal Co.; John Griffen, coal & coke consultant; C. C. Cornelius, Baton Coal Co.; D. H. McFadden, Ayrshire Collieries Corp.; John Donan, consulting engineer; Jack Bishop, Truax-Traer Co., floor committeeman.

Perhaps the most significant feature of experience to date lies in the fact that no serious breakdowns have occurred and there have been no indications of any design defects. The shakedown period has been characterized by an almost complete absence of the type of failures and delays which would be considered normal in putting into operation a highly complicated mechanism of almost completely new design.

In discussion, A. F. Busick, vice president, Marion Power Shovel Co., Marion, Ohio, said that his company was vitally interested in the success of the 60-yd shovel. He showed slides picturing some of its parts, including the boom, dipper and handle, crawler, crawler assembly, axle, roller circle, frame sections, and power and hoist apparatus.

"A time study will indicate when an improvement in shovel performance can be achieved by changing the conditions under which it operates."

Time study is an important tool of the industrial engineer for improving performance and efficiency to reduce costs. Of the various ways by which management might reduce costs, the most permanent, and therefore the most important, is by improving the performance and efficiency of both the machine and the man, declared William W. Youngblood, superintendent, Mine No. 2, Midland Electric Coal Corp., Farmington, Ill.

As applied to stripping shovels, the point has been reached long ago where very little physical energy is required. Hence, the human element in the man and machine equation has become a relatively minor, though still important factor. The machine offers the widest latitude for reducing costs.

Costs can be reduced by getting more useful work done per unit of time and by increasing the percentage of actual working time. The best way to start is by making a time study.

To get the maximum benefits from such a study, there must be an understanding and knowledge of the conditions under which the stripping shovel must work, as well as the nature of the bank material to be dug. A time study will indicate when an improvement in shovel performance can be achieved by changing the conditions under which it operates.

One way to get more productive work out of a shovel is to increase the actual digging time by decreasing the delay time. Another way is to increase the productive work of the shovel by decreasing the digging cycle time and by increasing the bucket factor or yards per bucket.

Another very advantageous use of a time study is in future planning and estimating of coal production. In most strip mines this is limited by the capacity of the stripping shovels. By accurately knowing this capacity, the engineering department can make reliable estimates of coal tonnage for the months and years ahead.

"The most important thing to remember when considering haulage units is that they are only one link in the chain of production."

It is difficult to prove that any one size truck haulage unit can be operated for

INDUSTRIAL ENGINEERING—John H. Gooch (left), Ingle Coal Co.; W. E. Hess, Vesta-Shannopin Coal Div., Jones & Laughlin Steel Corp., floor committeeman; J. Allan Brookes, Mather Collieries, Pickands Mather & Co., chairman; H. E. Jones Jr., Amherst Coal Co.; Ralph B. Dean, Lorado Coal Mining Co.; John W. Straton, Princess Elkhorn Coal Co.; Walter Weaver, Vesta-Shannopin Div., Jones & Laughlin Steel Corp.

CONTINUOUS MINING—John Boyd (left), J. W. Woomer & Associates, floor committeeman; F. Earle Snarr, Freeman Coal Mining Co., chairman; R. N. Morris, C. H. Mead Coal Co. Div., The North American Coal & Dock Co.; Michael Yonko, Powhatan Mining Co.; E. H. Roberts, Inland Steel Co.; Robert Billings, Rochester & Pittsburgh Coal Co.; G. W. Locklin, Inland Steel Co.

less money than the others, according to W. W. Spencer, assistant chief engineer, the Pittsburg & Midway Coal Mining Co., Pittsburg, Kansas. The difficulty arises from the many different conditions affecting final cost, such as, weather, pit floor, type of road material, road grades and length of haul.

Mr. Spencer's haulage-cost records show that operating expense for 20- and 40-ton units remain fairly constant. And where the maintenance cost for 40-ton units is higher than for 20-ton units, the differential is usually traceable to adverse weather conditions; it does not mean that 20-ton units require less maintenance.

Another comparison of six conventional 40-ton units with a torque converter unit indicated that fuel and other operating costs for the torque converter unit were 40% higher. However, lower maintenance costs for the torque converter unit more than made up for its higher operating costs. Here again it is difficult to arrive at a fair comparison, even though the total operating and maintenance cost for the torque converter over a 2-yr period showed a saving of $3,990 over the average of the other units.

The most important thing to remember when considering haulage units is that they are only one link in the chain of production. Effort should be concentrated on determining the percentage of production for which one truck should be responsible.

Commenting on truck haulage, Fred Bramer, equipment superintendent, Enos Coal Mining Co., gave operating and maintenance data on his company's fleets of Mack and Dart trucks. He said that dust was the greatest enemy to best truck performance, adding that roads should be kept sprinkled when there is insufficient rain. Floor discussion indicated considerable interest in Mr. Bramer's statement that tire life for his company's trucks were averaging about 47,000 miles.

"Constant high production must be maintained at any mine, and good roads are the only way this can be accomplished."

Severe cold and heavy snows are among the conditions encountered in stripping lignite in N. Dakota, observed R. I. Richardson, executive vice president, Dakota Collieries Co., Div. of Twin Star Industries, Inc., Beulah, N. D., in a discussion of road construction opening the second strip session, with T. G. Gerow, consultant, as chairman. Since lignite cannot be stored, and since most of the production goes to steam plants, "we must be prepared to load coal in any kind of weather. Thus, it is very necessary that our roads be constructed so that a steady production of coal can be assured."

Construction is based on a road patrol for preliminary work, with assistance from bulldozers for heavier work and draglines for deep cuts, spreading 60 ft from the road and parallel to form a snow fence. Other practices and standards include the following:

Making fills layer by layer over the years until full height is reached because of the sandy nature of the soil, thus insuring a solid road bed with a minimum of trouble.

Using a stepped-type road where grades must be negotiated for less driver and equipment strain.

Building roads wide on natural ridges

CONTINUOUS MINING—C. E. McWhorter (left), Goodman Mfg. Co.; J. O. Cree, West Virginia Engineering Co.; C. T. Hayden, Sahara Coal Co., floor committeeman; John A. Stachura, Enoco Collieries, Inc., chairman; Frank Williams Jr., Peck's Run Coal Co.; J. C. Leighton Carboloy Dept., General Electric Co.; Joe T. Taylor, Kaiser Steel Corp.

as far as possible to prevent drifting of snow. Wide roads also help with dust in the summer and ridge-top location facilitates drainage, a major consideration in road maintenance.

Ridging snow parallel to and about 50 ft away from the road with a patrol or bulldozer for an effective, economical snow fence.

Making pit entrances one way to prevent backing and turning, and using a vertical cutter to face up the coal, preventing accidental breaking of the berm by the loading shovel, speeding up loading and increasing coal recovery.

Hard-surfacing, Mr. Richardson noted, is impracticable under N. Dakota conditions. Consequently, 3 in of scoria, or material formed by the burning of lignite close to the surface, is applied each spring for a good all-weather road. When snow is encountered, it is cleared before the trucks start operation and clearing is continued during the shift to prevent slippery conditions and maintain a good running surface.

"New improvements in drilling and blasting procedures are constantly being sought out by the stripping industry."

In presenting a roundup of recent developments in drilling and blasting overburden, A. E. Lamm, executive vice president, Sunnyhill Coal Co., Columbus, Ohio, noted the trend toward air rotary drilling and the mounting of larger-sized rotaries on wide crawlers and the smaller on trucks. Drilling speeds are now 4 to 8 times those possible with the old churn units, and large holes—up to 12 in or more—are now possible. Specific developments listed by Mr. Lamm included the following:

Hydraulic rotary head drive for infinite speed variation.

A 90-ft mast on a large rotary to eliminate tool changes. Making the stern in the form of an auger helps remove cuttings from the hole (United Electric Coal Cos.). Removal of surface material at United Electric's Fidelity mine by the wheel excavator has saved by shortening holes 30 to 40%, eliminating hole squeezing and casing, and reducing bit cost by obviating drilling through clay.

Water injection for settling dust.

Development of vertical auger capable of penetrating coarse sand rock to 100 ft with a 9-in hole. Where conditions permit, production has reached 600 ft per shift.

Development of two new horizontal drills using rotary bits.

Augering through surface material and then changing to regular rotary equipment to eliminate hole squeezing and the need for immediate loading, plus faster drilling. Saving in bit cost is 2½c per foot (Southwestern Illinois Coal Corp.).

Development of breaking mediums using technical-grade ammonium nitrate rather than the commercial grade employed in Akremite; also the development of Unamite by United Electric and similar products by others, consisting essentially of 90% technical-grade ammonium nitrate, 5% coal dust and 5% nitromethane. No

ROOF SUPPORT—P. L. Shields (left), Spring Canyon Coal Co., chairman; H. A. Cassell, J. W. Pero, Pocahontas Fuel Co.; Paul Gill, Clearfield Bituminous Coal Corp.; Robert Fletcher, J. H. Fletcher & Co.; M. E. Prunty, Consolidation Coal Co.; E. M. Thomas, USBM; W. J. McCullough, Snow Hill Coal Corp.; W. J. Rude, American Gas & Electric Service Corp., floor committeeman.

COAL PREPARATION—Andrew J. Gaber (left), United Electric Coal Cos.; R. G. Pfahler, consultant; James C. Gray, Coal Div., U. S. Steel Corp., chairman; H. L. Beattie, Elk River Coal & Lumber Co.; L. I. Cothern, Jewell Ridge Coal Corp.; P. L. Richards, U. S. Steel Corp.

primer is required under certain conditions, and hole spacing can be increased with a rise in production per pound shot.

Reduced prices for liquid-oxygen explosives, which have permitted reactivation of some pits where shooting with conventional fixed explosives was too costly.

Increased use of detonating fuse, as well as MS delay connectors to reduce vibration. MS connector costs, however, have resulted in a search for other methods, including blasting timers. A new type of timer utilizes a cable with leads directly from the cable to the hole. Although not yet used for over 10 holes it has effectively reduced requirements for detonating fuse and MS connectors (Hanna Coal Co.).

"The number of rotary drills available today permits the operator to choose the size most suited to his operation."

While there are definite savings in large hole drilling, the final selection of hole size must be governed by the depth of overburden, monthly yardage and the final cost of drilling per cubic yard of material. George D. Grayer, sales engineer, Bucyrus-Erie Co., Milwaukee, thus summarized his views on the trend toward use of large rotary drills in strip mining.

Because large-hole drills are more expensive than smaller drills, their full capacity should be used to obtain lowest cost per cubic yard. Selection of the proper drill size is important and the number of rotary drills available today permits the operator to choose the size most suited to his operation.

Mr. Grayer noted certain limiting factors in the design of rotary drills for large-diameter holes. Among these he included weight of the bit, position of the drill pipe, and upward air velocity to bail the hole.

Rotary bit manufacturers recommend a bit loading of 5,000 lb per sq in of bit diameter to overcome the compression strength of most hard rocks. Bit loading can be less for softer rocks such as shales and limestones.

Drill-pipe position should be consistent with good design and proper balancing of various components. It should fall somewhere between the extremes of locating the pipe at one end of the machine and the center of gravity.

Generally accepted minimum bailing velocity should be about 3,000 fpm for materials having a weight equal to limestone. For drilling materials of heavier density, air bailing velocity must be increased.

"Equipment maintenance is the most important single function of any successful operation."

Good maintenance requires a chain of command with each period charged with definite responsibilities and duties, declared W. C. M. Butler Jr., vice president, Central Pennsylvania Quarry, Stripping & Construction Co., Hazleton, Pa. At Central Pennsylvania, the shop and maintenance superintendents work together and with the purchasing agent. The maintenance superintendent also is over the job superintendent as far as shutting down and overhaul is concerned, but the latter has the responsibility for preventive maintenance. A tire man and a roving preventive maintenance man work under the maintenance superintendent and "really save us money." Facilities include a large central shop and warehouse installation, plus participation with others in a parts pool.

The preventive maintenance functions of the job superintendent include the following:

1. Inspection and scheduled maintenance by drivers and operators.
2. Servicing and fueling, using a mobile tank truck.
3. Lubrication, using a lubrication truck.
4. Road maintenance to keep down equipment maintenance.

Field maintenance normally is limited to replacement of parts, subassemblies or complete assemblies. Except for shovels, all overhauling is done in the shop. A parts trailer is employed to facilitate field work. The time for bringing a unit into the main shop for overhaul is determined by operating records and inspection.

Tire checking is handled by a specialist driving a compressor truck. His work is supplemented by periodic checks by manufacturers' representatives. Other checking is handled by a qualified master mechanic with a truck and the necessary tools, working from a preventive maintenance check list. One copy of the findings goes to the job mechanic and the other to the job superintendent. "In addition, our shop checks all new equipment to reinforce wear points before the equipment goes into service."

"Maximum running time of stripping equipment is our aim."

Highwall shooting was placed high up on the list of musts in good preventive maintenance by Roy M. Leseney, mechanical superintendent, Truax-Trear Coal Co., Canton, Ill. Sharp dipper teeth are next on the list, followed by dipper door snubbers, two-way radios, cab-to-ground communication systems on certain equipment, Calrod heaters in dippers and round dipper handles in the winter, and better alloy steels for critical parts.

Helpful tools and equipment include a derrick truck and power winch, power tools, lightweight lever chain hoists or come-alongs, hydraulic jacks and presses, plus a 2-yd dragline used as a crane when necessary. Welding and cutting are important and facilities include a cutting torch on each machine with a hose long enough to reach most of the points that may need attention. Parts replacement is based on complete assemblies or subassemblies where possible.

Maintenance for Deep Mines

"Maintenance supervisors must be taught that, within reason, money must be spent in order to make money."

The emergence of planned, scientific maintenance as an operating necessity in modern coal mining was evident in the

STRIP MINING—T. G. Gerow (left), consultant, chairman; R. I. Richardson, Dakota Collieries Co. Div., Twin Star Collieries, Inc.; Arnold E. Lamm, Sunnyhill Coal Co.; George D. Grayer, Bucyrus-Erie Co.; Roy M. Leseney, Truax-Traer Coal Co.

remarks of a number of speakers, including Donald B. Shupe, mine superintendent, Eastern Gas & Fuel Associates, Wharton, W. Va., lead-off speaker at the Monday afternoon maintenance session. R. R. Williams Jr., manager of mines, Colorado Fuel & Iron Corp., Pueblo, Colo., was chairman.

Since a major portion of maintenance responsibility rests on the section foreman and section repairman, these men had to be sold on the idea of "fix it now," Mr. Shupe said, as opposed to the old idea of patching a machine to keep it running. Management also found it necessary to teach the men that major repairs or replacements, though on the surface costing larger sums, usually paid off in extra production by eliminating delays common to faltering equipment.

One of the big values in assigning a section mechanic to the production crew, Mr. Shupe said, is the increased respect for maintenance men that has been engendered among section supervisors. At Wharton, the section foreman is responsible for hour-to-hour maintenance of the equipment, but this responsibility has been recognized by management by following through with training programs on print reading, lubrication and so on.

Mine Lighting

"Total tonnage handled per man shift by the lighted section was 17% above that of the next higher production section."

This was the conclusion of S. P. Carter, superintendent of maintenance, Armco Steel Corp., Montcoal, W. Va., in wrapping up a description of fluorescent-lighting experiments at his company's Dorothy mine.

The lighting system has only three components, the light fixture, the power cable, and the power conversion unit. The power unit consists of a 25-hp 1800-rpm 250-V DC motor, coupled directly to a 3-phase 120/240-V 60-cycle 18.75-kva AC generator. This unit is capable of furnishing power for 270 lamps. Four main-lighting circuits are taken from the power distribution box to light the section which has five entries. There is one circuit for each of three inside entries. The fourth circuit lights the mine-car loading point and the supply yard. There is no work or travel in the two outside entries outby the last open crosscut. Therefore, no lights are needed in these areas. Thirty lights are required for each of the three inside entries when they have been advanced a maximum distance of 450 ft from the mine-car loading station, Mr. Carter explained.

The major accident record of the six production sections of the Dorothy mine from May, 1954, when the lights were installed, to the present time, a period of approximately 24 mo, is as follows: Three of the sections have each had one accident; one section has had two accidents; one section has had five accidents; and the lighted section has not had an accident during this period.

A comparison of the production performance of the six sections of this mine for 1955 shows for the lighted section 25.8 tons per man-shift of clean coal and 8.0 tons of impurities per man-shift, due to a middle band in the seam. The lighted sections and this section also handled the largest tonnage of impurities.

In formal discussion of Mr. Carter's paper, R. E. Havener, electrical engineer, Mine Safety Appliances Co., Pittsburgh, pointed out that USBM has developed a schedule covering the requirements that must be met by mine-lighting systems to pass muster on permissibility.

Aside from the bureau's schedule, Mr. Havener listed the requirements of a good lighting system, as follows:

1. The system should produce at least 5 ft-candles of illumination along the centerline of a mine opening.
2. The level of illumination should be uniform.
3. Lighting should be provided throughout all active sections, making it unnecessary for men to move from lighted to dark sections.
4. The lighting should be glare-free.
5. Units should be portable and rugged.
6. Means should be provided to rapidly advance the lighting units.
7. Lighting units and accessories must require minimum maintenance.
8. Hangers must be simple and inexpensive.
9. AC power is preferable for mine lighting.

Electrical Maintenance

"We have in operation 10 m-g sets and 12 mercury-arc rectifiers in 11 substations, so we need the best possible maintenance program."

Thus setting the tone for his description of how ventilating and power-conversion equipment is maintained in the Vesta-Shannopin division of Jones & Laughlin Steel Corp., B. R. Walburn, general master mechanic, California, Pa., pointed out that hoisting engineers have been trained in how to service and maintain the substations and fans within their view, and that equipment and station design has been standardized to the greatest possible extent.

Furthermore, maintenance schedules have been prepared, like this one which has been set up for fan inspections:

Hourly

Inspect all fan and motor bearings.

Inspect and compare water gage with chart.

Inspect bearing temperature recording or indicating instrument.

Daily

Test fan signal for operation.

Inspect brushes for wear and arcing at collection ring.

Inspect belt for track and slippage.

Change chart at the same hour.

Check condition and operation of equipment in general.

Ventilate building as necessary.

Weekly

Clean fan house.

Open bearing drain plug, where required, to make sure bearings are taking oil.

Check supplies.

Six Months

Change oil in fan and motor bearings.

Check blades or spokes on fan.

Check tripping device for operation.

Check all mechanical and electrical bolted connections.

Check all relay and protective device settings.

Clean all relay and breaker auxiliary contacts.

Yearly

Clean all equipment and blow out with air.

Thorough inspection of belt.

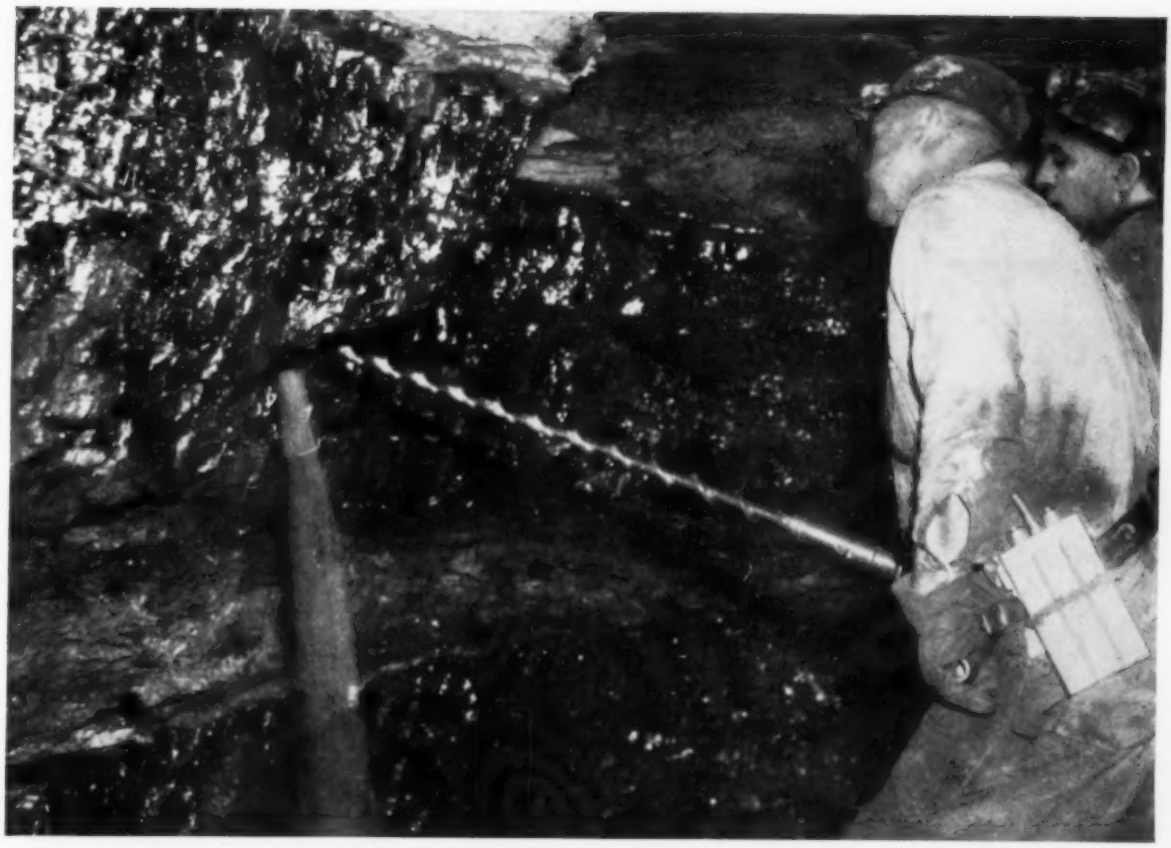
Check oil in power transformers and oil breakers.

Paint floor and motor.

Make complete inventory of supplies and spare parts.

Similar listings also are prepared for m-g set and rectifier servicing.

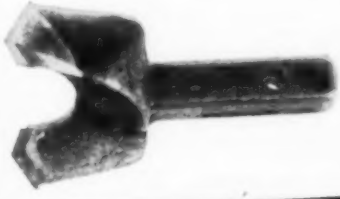
(Continued on p 158)



8400 FEET IN TOUGH ALMA SEAM DRILLED WITH KENNAMETAL* D-1⅞" BIT

RESULT:

Drill time per 8-ft. hole now one minute; bit cost cut to $0.0038 per ton



Use of Kennametal D-1⅞" Drill Bits at the No. 12 Alma Mine, Sycamore Coal Company, Mingo County, West Virginia, for drilling their tough Alma Seam, has resulted in the low bit cost of $0.0038 per ton and fast drilling time of one minute for an average 8-foot hole. This is considered very satisfactory in handling Alma Seam conditions of a hard bottom, a 42" bench of bottom coal, a 10"-40" hard slate parting, and a 24" bench of top coal overlaid with 10" of slate and a strong roof. As many as fifteen 8-foot holes have to be drilled and shot in the 30" to 40" range to bring down both the coal and parting for handling. In mining the lower bench, five 8-foot holes are drilled, starting at the center and angled toward the parting.

Whether it is drilling in problem areas or in clean coal, you will find a Kennametal Drill Bit to do the job fast, with low bit and maintenance cost and long bit service. Ask your Kennametal representative to show you these bits. Then try them in your mine. KENNAMETAL INC., Mining Tool Division, Bedford, Pennsylvania.

*Registered Trademark

Kennametal 8-foot augers and BR-17 adapters were also used

INDUSTRY AND
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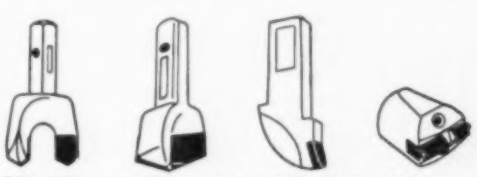
...Partners in Progress



DRILL BITS ROOF BITS MACHINE BITS ROCK BITS

FOREMEN'S FORUM

Don't Trust the Roof . . . . . Support It

Still the No. 1 Killer in coal mines is falling roof, according to recent report of the Bureau of Mines

Here are the facts in the case and some suggestions for improvement for underground supervisors

The Facts:

How many victims? In 1955, falls of roof were responsible for 194 fatalities out of the 299 which occurred underground, according to the report, HSS No. 445, prepared by E. R. Maize and J. J. Wallace, mining methods research engineers, USBM. In 1954, 177 men were killed by roof falls. The rate of roof-fall fatalities per million man-hr of exposure remained at 0.53 for both years.

Where were they killed? The record shows that 74% of the victims were killed within 25 ft of the face, and 60% of these were killed between the last permanent support and the face, an average distance of 9 ft. These cold percentages mean 144 lives and 86 lives, respectively. Thirty-one men lost their lives in places where roof bolts are specified as a systematic means of support. More than half the fatalities, 58%, occurred in places where coal is loaded mechanically, and 66 hand loaders lost their lives from this cause.

Here are other facts on the locations of roof-fall fatalities: 66 men were killed in the immediate face area in solid workings, 42 were killed at face intersections, 41 in pillar workings, 22 at intersections some distance from the face, 18 on haulageways distant from the face and 5 unknown.

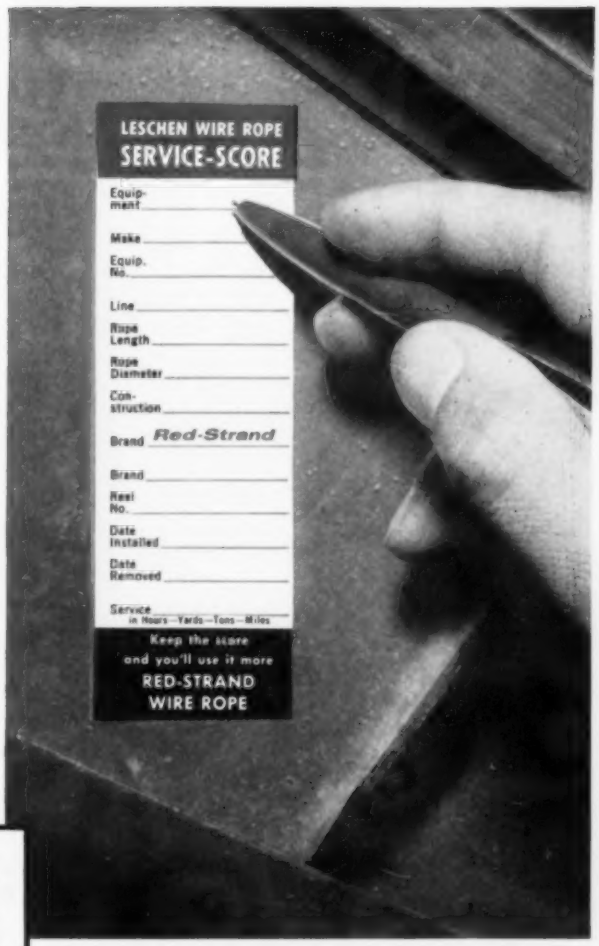
Were the victims inexperienced? No. Average age of the victims was 43 yr and their average mining experience was 20 yr.

When did the fatalities occur? Of the 194 roof-fall fatalities, 134 occurred on the first shift, 48 on the second shift and 11 on the third shift. One is unknown with respect to time of occurrence.

(*Continued on next page*)

Now Leschen Offers

NEW WIRE ROPE Service-Score SYSTEM



Leschen's quick-fact-finding Service-Score System utilizes easily applied, easily removed pressure sensitive stickers, which record equipment and rope data, dates of rope installation and removal.

Simple plan tests wire rope performance and costs—shows comparative values—helps reduce operating expenses—speeds reordering.

What is your *true* wire rope cost? Do you know? Are you using the right rope type or construction? The right brand?

Questions like these are readily answered with Leschen's new Wire Rope Service-Score System.

Service-Score stickers report performance—type versus type, brand versus brand. Performance facts reveal costs and help *cut costs*.

Service-Score stickers provide easily-available, *helpful reordering data*—equipment identification, wire rope diameter, length, construction, date installed, and date removed.

Service-Score stickers remind operators when it's time to replace rope—*increasing safety* margins.

Service-Score records enable you to check and compare wire rope types and constructions. For example, you find for yourself, as others have, that Red-Strand consistently scores high. You learn the advantages of super-strength Porter Imperial Red-Strand, or Hercules Flattened Strand.

Write for sample stickers. Or see your nearby Leschen Wire Rope distributor.

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Keep the score and you'll use it more—Red-Strand Wire Rope

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COORDINATED PLANNING RESULTS IN *Something Extra*

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For more than half a century Fairmont Machinery Company has been producing coal handling and preparation plants with "Something Extra"! "Something Extra" which is the direct result of painstaking coordinated planning plus responsibility. Here, then, are the reasons why a coal preparation plant by Fairmont is a model of top operating economy and notably increased separating efficiency—both of which lead to the upgrading of your product . . . a vital factor in pleasing today's discriminating coal buyers.

TURN TO FAIRMONT for the "Extras" which will put you out ahead:

1. *Coordinated, qualified engineering, fabricating and erecting.*
2. *Choice of equipment best adapted to your specific requirements.*
3. *Skilled pilot crews to smooth out operational "know-how" of your own men.*
4. *A competently-planned installation for your present needs with provisions to cope successfully with future demands.*

If you have a knotty preparation problem—if you want a plant which will turn out a guaranteed uniform product and give you over 99% separating efficiency through a product size range of ⅛" to 10" in any tonnage capacity—

Call A FAIRMONT engineer.

FAIRMONT MACHINERY COMPANY

FAIRMONT, WEST VIRGINIA

DESIGNERS AND CONSTRUCTORS OF COMPLETE COAL PREPARATION PLANTS USING BOTH WET AND DRY CLEANING, CENTRIFUGAL AND THERMAL DRYING.

How big is a roof fall? Average dimensions of the falling material were 10 ft long, 9 ft wide and 1¾ ft in thickness. In wide places, 19 ft or more, 105 men were killed. In places from 13 to 18 ft wide, 67 fatalities occurred. In places 12 ft wide or less, 14 were killed.

What were the victims' jobs? Thirteen of the victims were foremen, 66 were hand loaders, as mentioned, 38 were loading-machine operators or helpers. Others included 24 shot firers and drillers, 15 cutting-machine operators and helpers, 14 timbermen and roof bolters, 12 transportation employees and 12 trackmen, pumpers and utility men.

What size were the mines? Here is what the Bureau report has to say:

Number of Employees	Number of Fatalities	Percent of Fatalities
1–5	23	12
6–14	23	12
15–50	22	11
51–100	27	14
101–300	55	28
301–	44	23

Daily tonnage	Number of Fatalities	Percent of Fatalities
0–200	53	27
201–500	20	10
501–1,000	22	11
1,001–2,500	39	20
2,501–5,000	36	19
5,001–	24	13

It will be noted from the foregoing, the report says, that small mines, both in employees and production, had an inordinate number of fatalities. Mines employing from one to 50 men were responsible for 68 fatalities, or 35% of all.

All Hail the Pirates!

THE BUCCANEERS are swashbuckling again. On a recent bright day their cutlasses whirred and Dodger heads rolled all over Ebbets field. When it was all over, the Pirates walked away with this booty: two victories on 30 hits and 21 runs. As this is written they're playing .500 baseball against the so-called better teams in the league. We have no delusions about the Pirates "going all the way," but we like the respect they are getting.

It takes time for a team to jell and to come to the point where everybody does the right thing at the same time. So if your crew can't seem to maintain a rhythmic cycle at the face, don't give up, it may take time, but smoothness in operations is worth working for.

Tough Fibre

A RECENT NEWS STORY told of an incident in the life of a tough boy. Morally tough, we mean. A lad of character. Here's the story:

A 13-yr-old Boy Scout, Joel Schaeffer of Chicago, needed only the hiking merit badge to become an Eagle Scout. One of the requirements for the merit badge is that the scout complete a 20-mi hike in one day. On a Sunday morning, last April, Joel set out on the historic 20-mi Lincoln Trail near Springfield, Ill., to earn his hiking merit badge. But Joel was doing it the hard way — on crutches. He is a victim of polio.

After the hike, which required 13½ hr, he said he was a "little tired." It is significant, we think, that the Scouter who accompanied Joel on his hike is nameless in the story. This was Joel's day.

We'll not do any sermonizing here, just sit back and think about that boy.

Likewise, on a production basis, mines with an output up to 500 tpd were responsible for 73 fatalities or 37% of the total.

What were some of the causes? The report says 34 men lost their lives because the timbering plan was not followed; 30 men died because there was no timbering plan or timbering was insufficient; 23 failed to take down or support known bad roofs; 19 victims were inby permanent supports or in worked out areas; 18 died because the timbering plan was inadequate; 12 failed to examine the roof or rib; 11 had no safety post in use. Seven fatalities were charged to poor supervision.

The Recommendations:

The Bureau's report closes with recommendations to management and employees, as follows:

To management . . .

1. Where timbering standards are in use they should be re-examined and fortified to increase their effectiveness. Where timbering standards are used they should be enforced. Roof-support standards should be set up for all mines—and rigidly enforced.

2. The excessive number of foremen being killed indicates a need for training foremen in accident-prevention duties to protect themselves and the employees under their supervision.

3. The use of temporary supports inby permanent supports should be required before men are permitted to work in the area.

4. Roof, ribs and face should be examined thoroughly before employees are permitted to work and frequently while they are at work in the face area. Dangerous or doubtful conditions should be promptly corrected.

5. All underground workmen should be instructed in the proper testing of roof, face and ribs.

6. Workmen should be prohibited from advancing beyond artificially supported roof, except those who are assigned to support or inspect the place.

7. Permanent supports in active workings should not be removed unless equivalent protection is provided.

8. Roof should be adequately supported when material is being taken down or when cross bars or roof bolts are being installed.

9. Supports accidentally knocked out should be promptly replaced.

To employees . . .

1. Each employee should take special training in accident prevention.

2. Workmen should examine the roof, face and ribs before starting work or before starting a machine and frequently thereafter. When dangerous conditions are found they should be corrected before work is continued.

3. Employees should co-operate fully with management in developing a suitable roof-support plan and in obtaining compliance with it. Under no circumstances should workmen accept less protection than the minimum afforded in the plan.

4. Employees should be constantly alert for changes in roof and rib conditions.

5. Roof supports should not be removed deliberately to facilitate loading or to allow free movement of equipment unless equivalent protection is provided.

6. Employees should use care when moving equipment so as not to disturb roof supports. Supports knocked out accidentally should be replaced promptly.

7. Temporary supports should be used at the face while roof bolts are being installed.

8. Persons should not advance beyond artificially supported roof, except those assigned to install supports or inspect the place.

We think every foreman should dedicate himself now to the worthy task of indefinitely postponing the next roof-fall accident in his own mine or section. It can be done only by working according to the rules. It is significant that only three out of the 194 fatalities were considered unavoidable by investigators.

Make this your motto: Don't trust the roof . . . support it!

By The Way . . .

Action without thought is like shooting without aim.

No one is small who does a small job in a great way.

Have patience! All things are difficult before they become easy. (*Saadi*)

The strongest words are usually used in the weakest arguments.

OPERATING IDEAS

Steel Forms Cut Slope Construction Time

A 50% SAVING in time required to place and remove forms for concrete work is being achieved by using special collapsible steel forms at the new slope of the Oakmont mine of the Harmar Coal Co., Barking, Pa., according to Glen Williamson, superintendent, Williamson Construction Co., Columbus, Ohio.

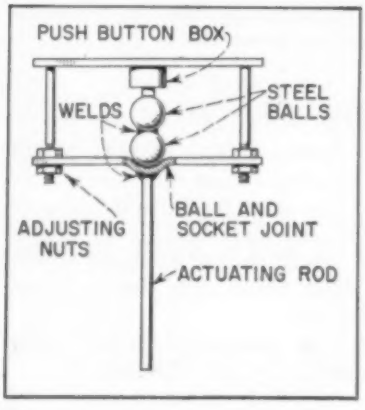
The forms, made up of side panels and arch sections, are split down the center for flexibility and an additional arch section can be added to form openings of varying sizes. To set the forms the arch section is raised into position by two hydraulic jacks at the end of the section. The sidewalls are secured in place by four steamboat ratchets, two on either side. Hydraulic jacks and ratchets are mounted on a steel truck that travels on steel rails.

Ribs and roof of the slope are given an initial coating of jetcrete before the forms are set. A five-man crew sets the forms and makes a complete pour in a 40-ft section in 2½ 8-hr shifts. Concrete is pumped over the collapsible forms through two pipe connections in the arch section. Inspection doors, three in the arch and three on the side panels of each 20-ft section, permit close observation of the pumping operation.

A complete cycle of lining two 20-ft sections includes the following steps: (1) 4 hr to set reinforcing rods; (2) 4 hr to take down and move forms; (3) 8 hr to reset forms; and (4) 4 hr to pump 70 cu yd of concrete.

Aside from offering the advantage of time saving, the steel forms provide overhead protection for workers and thereby eliminate the danger of accidents from roof falls.

Limit Switch Controls Coal Level in Bin



POSITIVE CONTROL over the level of coal in a bin or silo is achieved at the Guyan Eagle Coal Co., Amherstdale, W. Va., with a rod-type switch device developed by James T. Sauls, who works in the company's central shop. As the coal level rises in the bin, an actuating rod extending downward into the bin also rises and depresses a pushbutton in the electrical circuit. This interrupts the current flowing to the conveyor feeding the bin. If it is not desirable to stop the conveyor automatically, the switch can be connected to a signal or warning device at the operator's station. Mr. Sauls reports that the switch will operate regardless of the direction in which the rod is pushed.

The chief components of the switch device include a pushbutton, such as is used on underground mining equipment; two steel balls; steel rod; steel base plate; suspension plate with socket; bolts and nuts to permit switch and rod adjustment.

Here's how the control is assembled. The pushbutton is enclosed in a box and attached to the mounting plate. The two steel balls are welded together and attached to the actuating rod which moves up and down in the ball socket. To provide a socket for the lower ball to rest in or pivot, the hole in the suspension plate is counterbored, or the area is heated and swaged into shape with a steel ball. The rod is placed through the socket opening on the suspension plate, which is then fitted over the bolts welded to the base plate. By moving the adjusting nuts, the ball end of the rod can be placed in proper position to operate the switch. The mounting plate may be any size or shape and the rod any length.

Cord plies spirally applied in
opposite directions, for highest flexibility

BUILT LIKE A TIRE...

it's the U. S. Royal Cord Air Hose!

Built like a tire—and *tough as a tire*, with a special construction found in no other air hose:

■ *Exclusive*. Two counter-spiralled plies of tough special cord floated on resilient rubber for outstanding strength, shear resistance and flexibility.

■ Braided cotton breaker ply anchors the tube to carcass *permanently*.

■ Tube is high-quality neoprene for maximum hot oil resistance.

■ Tough, brown natural rubber cover gives excellent resistance to cuts and abrasion—protects unique construction under extreme service conditions.

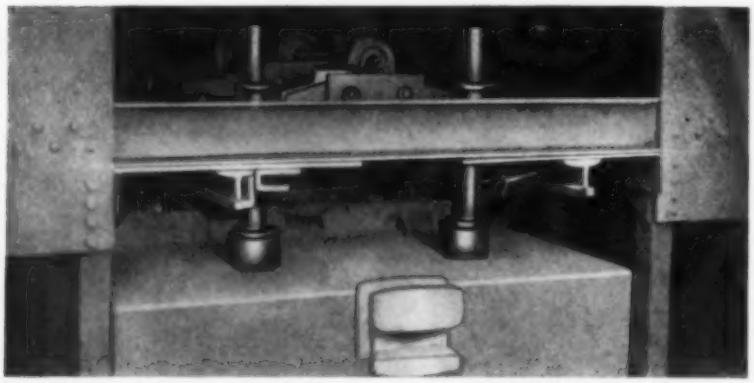
U. S. Royal Cord Air Hose has a very high hydrostatic value, with a minimum of contraction or elongation. It is so tough and flexible that it needs no cribbing, can be run over repeatedly by heavy machines without harm. The "hose that's built like a tire" is obtainable in continuous lengths from any of our 27 District Sales Offices, or write Mechanical Goods Division, United States Rubber Company, Rockefeller Center, New York 20, N. Y.

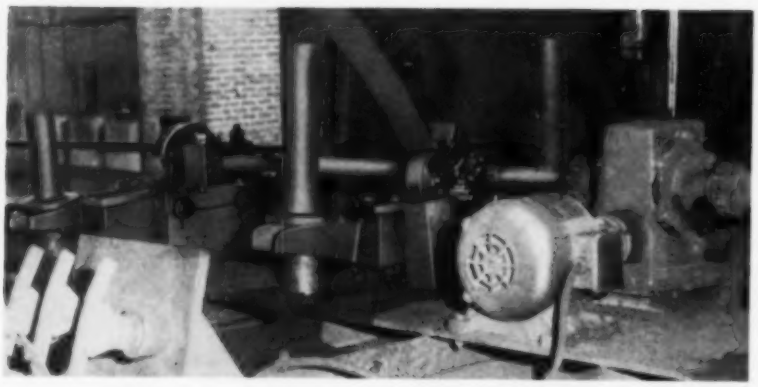
US RUBBER

Mechanical Goods Division

United States Rubber

Automatic Car Cleaner Removes Fines

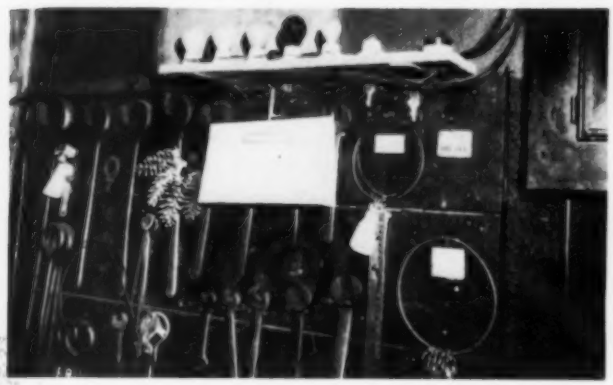


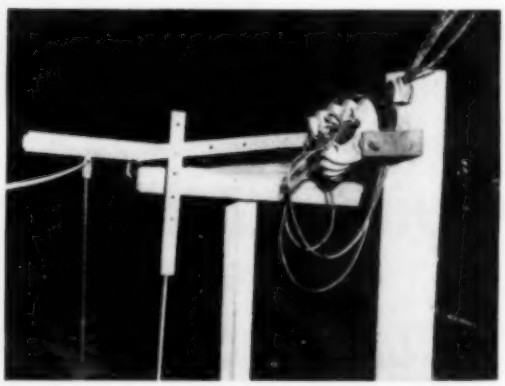


CLEANER MINE CARS and thus more payload per trip are achieved with an automatic electric car cleaner at a large West Virginia mine. After the first month of use, the device made it possible for the company to reduce the tare weight on each mine car by 200 lb. The coal flowing through the tipple also increased by 2,900 tons as a result of the increased payload per car.

Designed to free wet coal that clings to the corners and bottom of the car, the device also speeds unloading by making all of the coal flow freely. Coal is loosened and freed from the car by six hammers which strike against the bottom of the mine car after it is turned upside down in the rotary dump. As the dump turns the car to the inverted position electrical contacts are made to start the motor driving the car cleaner. Coal is loosened by the impact of the steel hammers which are moved up and down by pivoted arms operated by cams on the drive shaft. Each cam is mounted on a different position so that each hammer strikes the car at a different time. The shaft with six cams revolves once per second. Thus the car receives six blows per second.

Inventor of this patented device is N. A. Michaelson, 468 Rebecca St., Morgantown, W. Va. He reports that his invention permits fast and easy car cleaning, yet is simple in construction and is inexpensive. The unit can be designed to operate satisfactorily with any size mine car or rotary dump. Further information about the device may be obtained by writing to Mr. Michaelson or to the Valley Machine & Electric Shop, Inc., Box 169, Fairmont, W. Va.



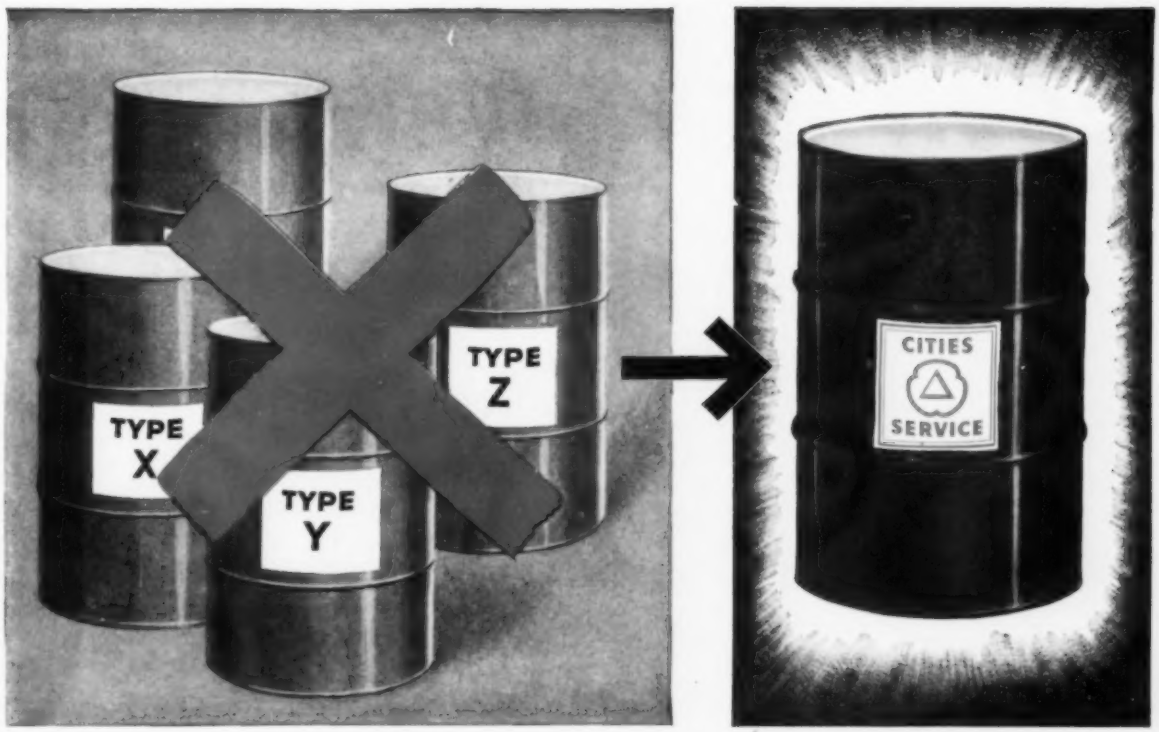


Indicator Lights Show Inflow Rate to Mine Sump

RATE OF FLOW to the main sump at the Kramer mine is shown by a group of five lights in the hoist room on the surface. Each light goes on when the water reaches a definite level. Lights are controlled by mercury switches operated by a float in the sump. As the sump fills or empties, a float rises and falls. A metal arm connected to the float rotates a metal rod on which is mounted a group of five mercury switches. Each switch is mounted in a different position about the rod so that as the float rises and in turn causes the rod to rotate, a different light goes on in the hoist room. The switches are positioned to operate the lights when the water level is at definite levels in the sump.

The hoist man records in a notebook what light is on when he comes to work. Throughout the shift he also records the time when the other lights come on or go off. Abnormal inflow to the sump or unscheduled stoppage of the pumps would be indicated by changes in the time at which the lights go on.

Limited sump capacity makes it necessary to watch the sump level carefully so that haulage roads will not be flooded and interfere with transportation. The main sump is pumped dry in the offpeak power period on the second and third shifts and is permitted to fill on the first shift. To provide a positive method of checking without going to the sump, James Whamond, mechanical and electrical consultant, Northwestern Mining & Exchange Co., designed the light system.



NOW—ONE GREASE FOR ALL YOUR EQUIPMENT

New Multi-Purpose TROJAN H Grease!

Let Cities Service Multi-Purpose Trojan H Grease, the remarkable new lithium base lubricant, take on the job of practically all your present greases and do a better job than any special grease.

Used for all types of bearings, chassis lubrication, water pumps and conveyor systems, this one unmistakable "red" grease is ideal for everything from the smallest service truck to the largest shovel.

New Multi-Purpose Trojan H not only has greater stability than previous greases, it also pumps easier at low temperatures, flows easier, and has exceptional resistance to water, oxidation, and rust. Best of all, it lasts longer and tests show it takes *less* to do this superior job of lubrication. Result: You save time, confusion, and money!

For more information about this unusual multi-purpose grease, talk with your Cities Service representative. Or write: Cities Service Oil Company, Sixty Wall Tower, New York 5, N. Y.

USE JUST ONE GREASE
and get all these benefits

- Simplified inventory
- No possibility of error in application
- Less grease consumption
- Easier dispensing
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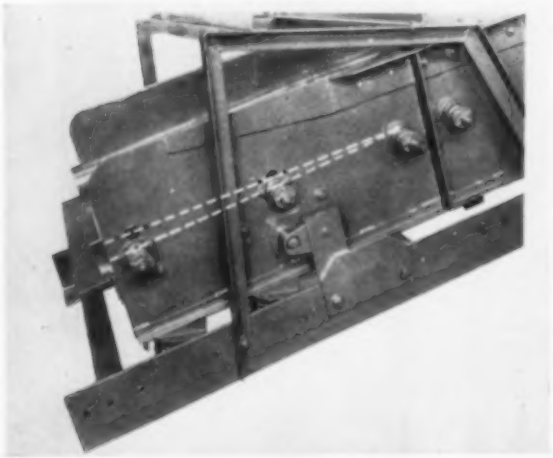
EQUIPMENT NEWS

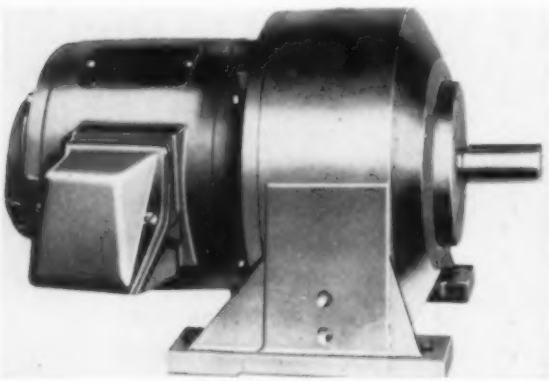


Screen Angle Choice

Deister Machine Co., Fort Wayne, Ind., has redesigned its Type UHS vibrating screen to permit an increase or a decrease in the screening angle by equipping the units with adjustable screen cloth panels at both the feeder and discharge ends. Thus, says Deister, operators have a choice of increased or retarded travel rates and chance for greater efficiency. The adjustment can be made with one wrench by aligning side tension spring clamps in either of two sets of holes drilled for positioning end screen sections at "high" or "low" angle (photo).

Feeder-Scalper Unit

A heavy-duty feeder-scalper that performs feeding and scalping functions in one operation has been introduced by Universal Engineering Corp., 625 C Ave., N. W. Cedar Rapids, Ia. Named the "Wobbler," the unit has a capacity up to 2,500 tph. Oval cross-section bars form the feeder's bed. Alternately vertical and horizontal, they turn synchronously to maintain relative positions and impart a rocking, tumbling motion. Self-cleaning is said to prevent blanking even in very wet material. Bed widths are 24 to 60 in.



Oil-In Dirt-Out Seal

A new line of gearmotors, AC and DC, 1 to 60 hp, is being manufactured by Reliance Electric & Engineering Co., 1088 Ivanhoe Rd., Cleveland 10, Ohio. Two-way seals lock in oil and seal out dirt. This feature, says Reliance, permits mounting in any position without oil leakage. The company recommends the gearmotors for advance operating conditions and offers a selection of mountings, enclosures and ratios.

Fits Any Drive

A barrel-shaped, low pressure (3 to 5 lb), pneumatic tire that can be powered through its axle by any conventional drive system has been introduced by the Aviation Products Div., Goodyear Tire & Rubber Co., Akron 16, Ohio. Named the "Terra-Tire," the unit is able to maneuver over all types of terrain and achieve speeds up to 65 mph without risk of puncture, according to Goodyear.

HOW TO STOCKPILE 25 TONS A MINUTE

Pittsburgh & Conneaut Dock Co. stockpiles a million tons of iron ore during the summer months, to create a reserve supply when ore boats cannot satisfy extreme demands. Four CAT* DW21s with Scrapers handle 1500 tons per hour for this Conneaut, Ohio, firm. That means a DW21 pulls away from the Stephens-Adamson conveyor every minute with a 25-ton load.

This company works two eight-hour shifts, six days a week during the navigation season. Its equipment must do a lot of work fast, and stay on the job. That's why a company official says: "We've had 12 years of experience with Caterpillar equipment. We considered other makes, but found DW21s did the job best."

Now there is a new and improved DW21 (Series C) with 300 HP (maximum output) Turbocharged engine. It has 10% greater rimpull and new, wide-section 29.5-29 tubeless tires for maximum traction. With the big-target No. 470 LOWBOWL Scraper (25-yd. heaped capacity), here's an ideal team for efficient materials handling and for earthmoving jobs in slack seasons. For jobs that are exclusively stockpiling, many firms find that DW21s with Athey haulers pay off.

If you want fast cycle times and traditional Caterpillar stamina, investigate the DW21 today. Your Caterpillar Dealer has full details and on-the-job proof that these big yellow rigs can do more work in less time at lower cost on *your* operation. And count on him for skilled service and parts you can trust.

Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

CATERPILLAR*

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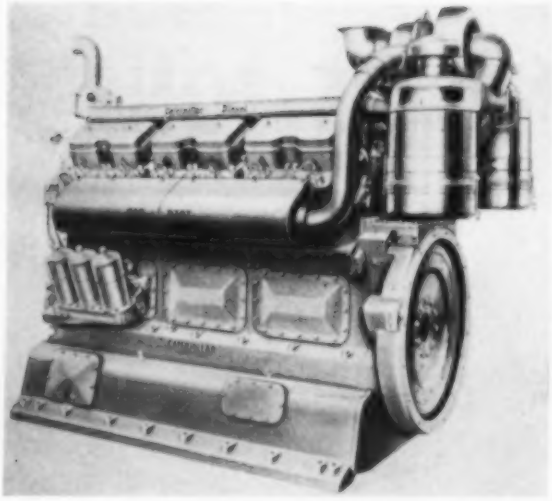
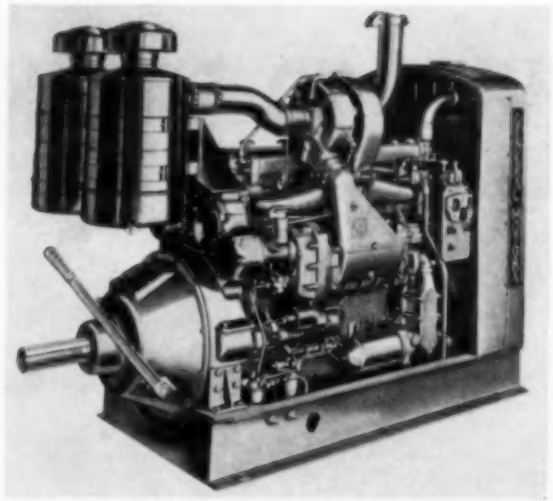
NAME THE DATE... YOUR DEALER WILL DEMONSTRATE



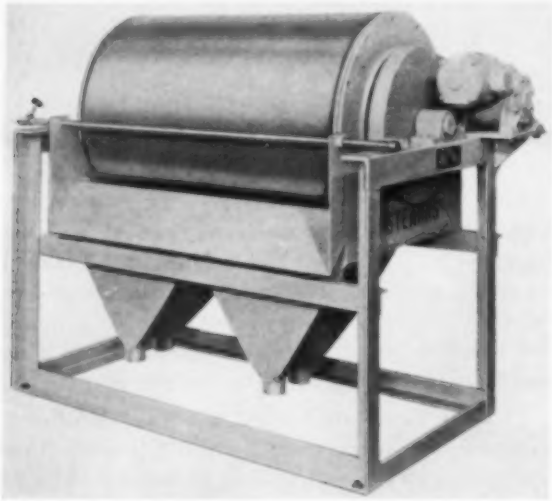
Designed for Heavy Duty

Two heavy-duty V-type engines, the D375 (8 cylinders, 430 hp maximum) and the D397 (12 cylinders, 650 hp maximum), have been introduced by Caterpillar Tractor Corp., Peoria, Ill. Both engines are made in turbocharged, roots-blown, naturally-aspirated and spark-ignited versions. Innovations: steel-encased fiber glass to insulate manifolds; 10:1 compressions; "deep-domed" pistons; low-tension magneto system. Spark-ignited versions use natural gas, produce 267 hp and 400 hp.



Turbo-Charged Diesels

Three "Turbopower" engines have been added to the Series 71 line of two-cycle diesels manufactured by Detroit Diesel Engine Div., General Motors, Detroit 28, Mich. The new models are four- and six-cylinder fan-to-flywheel engines and a six-cylinder base-mounted power take-off unit. Principal additions: a single-shaft, exhaust-driven turbine and an air impeller. The four-cylinder is rated at 171 hp at 2,300 rpm, the six at 236 hp at 2,100 rpm. Detroit Diesel says the engines are useful as replacement power for on- and off-highway trucks.

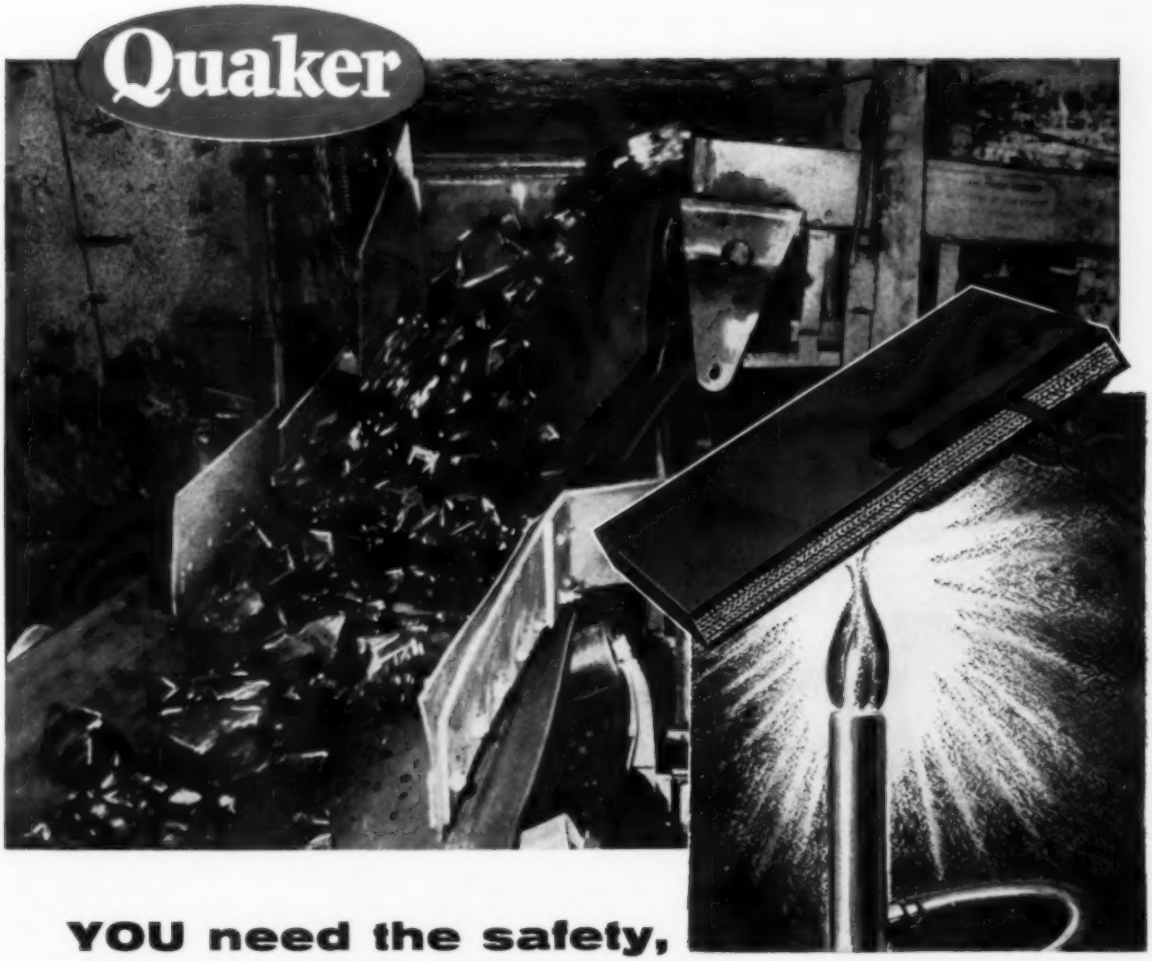


For Media Recovery

Stearns Magnetic, Inc., Milwaukee, Wis., announced last month that it is manufacturing a new, wet drum, magnetic separator. Designated the "WPD," the separator has been constructed with a powerful wet-drum permanent-magnetic unit that Stearns says has been designed for extremely efficient recovery of media in heavy-density plants. The specially-designed magnet, according to the manufacturer, provides correct flux distribution and will deliver positive transportation of collected magnetics to a discharge point. Stearns has equipped the separator with Alnic permanent magnets, which, the company says, eliminate the costs of rectifier or motor generator set, since the magnets require no external energization. Complete information is available from the company's bulletin 87.

Air-Controlled Clamshell

A pneumatic-closing, clamshell bucket designed for use with single-drum hoists is being manufactured by the Blaw-Knox Co., Pittsburgh, Pa. Blaw-Knox says the clamshell is the first to be produced with integrally contained power closing by a major bucket company. Manufactured in ¾- and ⅝-cu



YOU need the safety, service and stamina of this fire-resistant, flame-retarding belt

Your Quaker-Quaker Pioneer distributor can supply not only your standard needs—but also your highly specialized ones. You'll find him a prompt dependable money-saving source for everything you need in industrial rubber products. Write for free brochure and name of your nearest distributor.

Carrying the U. S. Bureau of Mines designation "Fire-Resistant U. S. B. M. 28-11" this belt actually exceeds the Bureau's essential standards for underground mine safety. For instance, while the specified flame-test permits burning up to 1 minute, flame is extinguished *instantly* when the test is made on Quaker's belt. Also, after-glow disappears in about one-third the time required by Bureau standards.

In addition to the essential safety, the belt is lightweight and highly flexible with good troughability, yet is tough enough to take shock impacts and stand up to the abrasive wear of heavy, jagged loads. For long service, low maintenance and dependable safety, specify "Fire Resistant U. S. B. M. 28-11" from your Quaker distributor.

HKP

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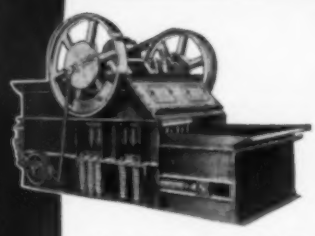
H. K. PORTER COMPANY, INC.

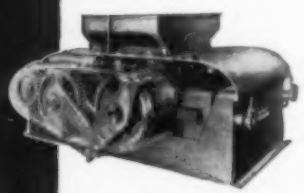
America's most complete line of CRUSHING EQUIPMENT

AVAILABLE FROM STOCK AND ON SHORT DELIVERY



McNally Norton Vertical Pick Breaker

50% less fines when reducing lump to egg and stove sizes.

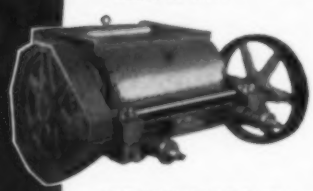


McNally Double Roll Gearmatic R. O. M. Breaker

Built in tonnage ranges from 750 tph to 1400 tph. Full floating Gearmatic drive.

McNally Gearmatic Stoker Coal Crusher

This unit offers three prime advantages:
High volume production, plus accurate sizing, plus low percentage of fines.



McNally Single Roll Crusher

Universal application. 20", 24" and 36" dia. rolls.

For immediate action on complete information write, wire or call . . .

M

★ Pittsburg, Kansas ★
★ Wellston, Ohio ★

Equipment News *(Continued)*

yd sizes, the bucket is controlled through open and close chains. Its air hoist is designed to hold the jaws of the bucket in position when the chain is released. Operation is echieved with 85 to 100 lb of air.

New Equipment for Earth-Moving

Heavy-duty 18- and 24-ton rear-dump off-highway trucks and a crawler-mounted 1¾-yd front-end loader were among new earth-moving units unveiled May 15 by International-Harvester Co., at the company's Dundee, Ill., proving ground. The new off-highway trucks, known as Payhaulers, Models 65 and 95, feature better visibility, higher speed and improved weight-to-power ratio, the maker says. The 18-ton Model 65 offers a choice of 5- or 10-speed geared transmission, either one permitting a top speed of 36.5 mph. The 24-ton Model 95, with a 4-speed torque-converter transmission, boasts a top speed of 38 mph. Both are powered by Cummins turbo-charged diesel engines, the Model 95 (top photo) developing 335 hp at 2,100 rpm and the Model 65 developing 250 hp at 2,100 rpm. Vehicle weights are as follows: Model 95 with a quarry body and torque converter weighs 47,980 lb empty; Model 65 with quarry body and 5-speed transmission weighs 40,160 lb empty.

The Model 12 crawler-mounted Payloader (bottom photo) is equipped with a 91½-hp diesel engine mounted at the rear to provide better balance without counterweight. The unit, made by Frank G. Hough Co., a wholly-owned subsidiary of International-Harvester, features a torque converter and "Paylomatic" power-shift transmission. Top speeds are 10.1 mph forward and 13.1 mph reverse. A design feature of the Model 12 Payloader simplifies maintenance. By removing two pins at the rear of the loader, releasing two jack screws at the front and applying up-pressure to the boom, the body tilts up to expose the rear deck of the main frame. With the loader properly secured in this position, the rear frame and bottom of the engine are fully exposed for servicing.

Other units shown were newly designed tractors in the TD-6, TD-9, TD-14, TD-18 and TD-24 lines, featuring "control-tower" visibility for the operator, cerametallic clutches, beefed-up engines, flush-deck cabs, combination foot- and hand-controlled accelerators, centralized controls and other features to increase operator comfort and efficiency. Also demonstrated were new models of the "55" and "75" Payscrapers, 14 and 20 yd capacity, respectively, heaped without sideboards, a line of Drott front-end attachments.

COUNT ON YOUR WICKWIRE ROPE DISTRIBUTOR FOR ENGINEERING ASSISTANCE

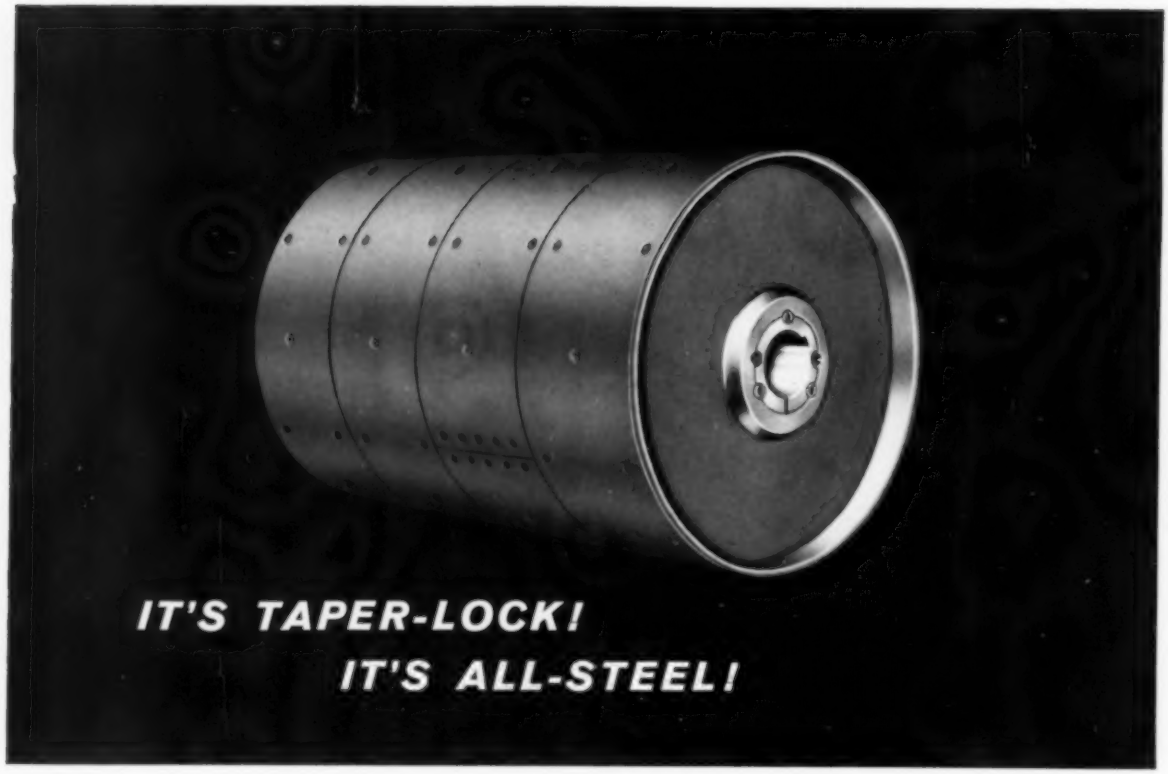
When it's a question of wire rope, the place to go is to your Wickwire Rope distributor. He knows your requirements. He knows wire rope and how it can be used to best advantage. In addition, he can provide you with this important extra—the technical assistance of Wickwire Sales Engineers. With the additional help of these capable specialists, he can give you expert, practical advice on even the toughest wire rope problems.

Your Wickwire Rope distributor is a good man to know. He's quality people handling quality products. Buy your wire rope and wire rope slings from him. You'll find that the many valuable services he offers far outweigh any apparent price advantage you might gain by buying direct.

CF&I WICKWIRE ROPE A CF&I PRODUCT

A PRODUCT OF THE COLORADO FUEL AND IRON CORPORATION

3150



The modern Conveyor Pulley for superior performance . . .

One tough application after another proves beyond doubt that you can't beat a lagged, Taper-Lock Steel Conveyor Pulley for the hard jobs! Here is the score on their use in rugged coke plant service. In this particular case the installation was on belts from the quencher and loading belts to cars. The report was made after *three years of use.*

1. **One-third saving on initial cost.**
2. **Saving on maintenance; no redressing of pulley faces.**
3. **No appreciable wear on lagging.**

In addition, these Taper-Lock Steel Conveyor Pulleys provide the further benefits which are inherent in their design:

1. **No bolts to shear.**
2. **Easy on — easy off.**

Taper-Lock Steel Conveyor Pulleys have terrific impact capability. All welds are made by the submerged arc process for 100% strength. Taper-Lock's patented back-up bar permits a weld of the full rim thickness to give 100% penetration. And there are no bolts to give way!

Normally available from stock in all face widths and diameters from 6 inches to 8 feet. *Write for bulletin*

DODGE MANUFACTURING CORPORATION, 3000 Union St., Mishawaka, Ind.

CALL THE TRANSMISSIONEER your local Dodge Distributor. Factory trained by Dodge he can give you valuable assistance on new, cost-saving methods. Look for his name under "Power Transmission Equipment" or write us.

DODGE
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WHY

Kensington Tracks

LAST SO LONG

There are two reasons why KENSINGTON tracks give longer service, even under the severest working conditions.

First, vastly improved design.

Second, they are made from a superior, wear-resisting alloyed manganese steel.

New design. KENSINGTON tracks have only three parts . . . the rail, the grouser, and the pin. Rails are cast in *one piece* to add strength and prevent wear caused by the constant twisting and weaving found in ordinary tracks.

Grousers have anti-shear lugs which fit snugly over the tie bar of the link to eliminate loose plates, elongated bolt holes, and side-sway. Grousers are heavied-up at all critical points to better resist bending and breaking.

Pins, constructed of a special alloy, are pressed tightly in place under high pressure to give further rigidity and near-perfect alignment.

Yet, even with all these design improvements, KENSINGTON track assemblies fit all standard, popular make crawler tractors.

Steel with stamina. Development of several remarkable wear-resisting alloyed manganese steels, including ORO Supermang and Kenkrome, has also increased the wear-ability of KENSINGTON tracks. These already-hard metals *actually fight back against wear!* They develop *extra* surface hardness when exposed to friction, abrasion, or impact. Yet, under this ever-hardening "skin," these metals stay tough and strong. That's why KENSINGTON uses Kenkrome in its rails and Supermang in its grousers.

Economical, too. Though KENSINGTON tracks cost slightly more than those supplied by the tractor manufacturer, they enable you to make substantial savings.

They give you many more hours of service per dollar of cost, less time lost for maintenance, and increased operating efficiency because KENSINGTON tracks keep their "pull-bracing grouser area" for a longer period of time. Also, you can maintain a smaller inventory of repair parts.

Discover for yourself how many hundred dollars these tracks will save you over the next few years.

Other wear-resisting KENSINGTON replacement parts

FOR TRACTORS
Kenkrome replacement rims for worn sprockets. Ready to weld on.

CRUSHER PARTS
Jaw plates, roll shells, mantles and bowl liners, hammers, grate bars and liners, etc.

FOR SHOVELS
Treads, rollers, racks, pinions and teeth . . . to fit all standard shovels.

CHAIN AND SPROCKETS
150 standard chains listed in new KENSINGTON Catalog plus many special chains. All of wear-defying Kenkrome.

Mail the coupon for further details on how much KENSINGTON tracks will save you in the "long pull."

Kensington STEEL COMPANY

KENSINGTON STEEL CO., Dept. C, 505 Kensington Ave., Chicago 28, Ill.
SUBSIDIARY OF POOR & CO., CHICAGO

Please send information on crawler tracks for tractor described below. I understand I will be under no obligation.

Make of Tractor_____

Model_____ NO. TRACKS PER BELT_____ WIDTH OF GROUSER_____

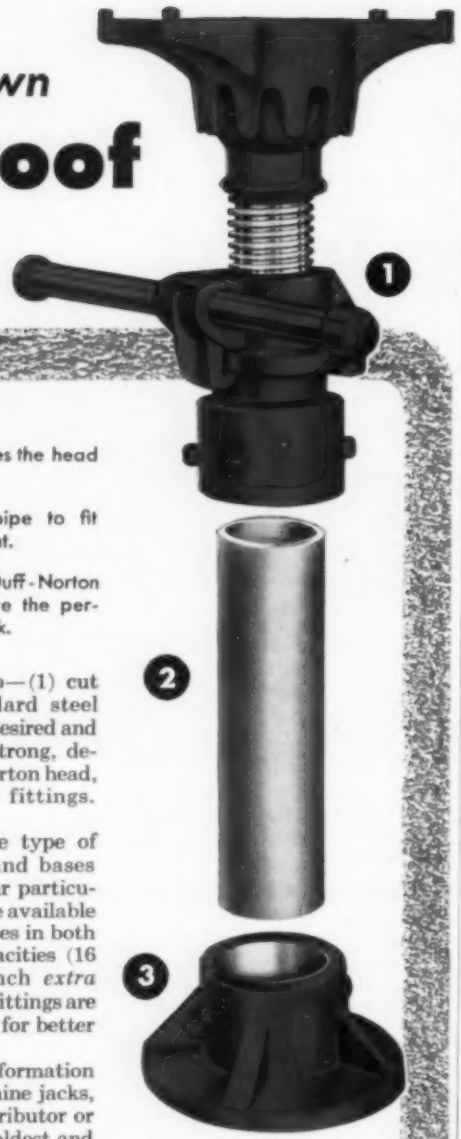
NAME_____

COMPANY_____

ADDRESS_____

CITY_____ ZONE____ STATE_____

how to
make your own
mine roof jacks



1. Duff-Norton supplies the head and handle.
2. You supply the pipe to fit your desired height.
3. Add the desired Duff-Norton base and you have the perfect mine roof jack.

Here's all you do—(1) cut any 2-inch standard steel pipe into lengths desired and (2) attach safe, strong, dependable Duff-Norton head, handle and base fittings. That's all!

You choose the type of heads, handles and bases best suited to your particular needs. They are available in a variety of types in both 8 and 16-ton capacities (16 ton requires 2-inch *extra strength* pipe). All fittings are painted light grey for better visibility.

For complete information on Duff-Norton mine jacks, see your local distributor or write the world's oldest and largest manufacturer of lifting jacks for your free copy of catalog AD-10J, "A Handy Guide for Selecting Duff-Norton Mine Jacks." This catalog contains complete information not only on mine roof jacks but other popular Duff-Norton jacks for useful trouble-free service in and around coal mines. Duff-Norton Co., P. O. Box 1889, Pittsburgh 30, Pa.

DUFF-NORTON

"Giving Industry A Lift Since 1883"

Jacks

DUFF-NORTON COMPANY

Equipment News *(Continued)*

Backhoe Digs to 13 Ft

The Hydraulic D4 Backhoe, a ½-yd unit being sold by the Hyster Co., 2902 N.E. Clackamas St., Portland 8, Ore., is designed for the Caterpillar D4 tractor. The unit is capable of digging to a 13-ft depth and loading to a 9½-ft height, according to Hyster. A rack and gear swing mechanism, enclosed in an oil-tight case, provides a 240-deg arc. To negotiate rough terrain, the backhoe has been equipped with an equalizer that permits full track oscillation. Dippers are made in cutting widths 13, 21 and 29 in and are fitted with replaceable steel points.

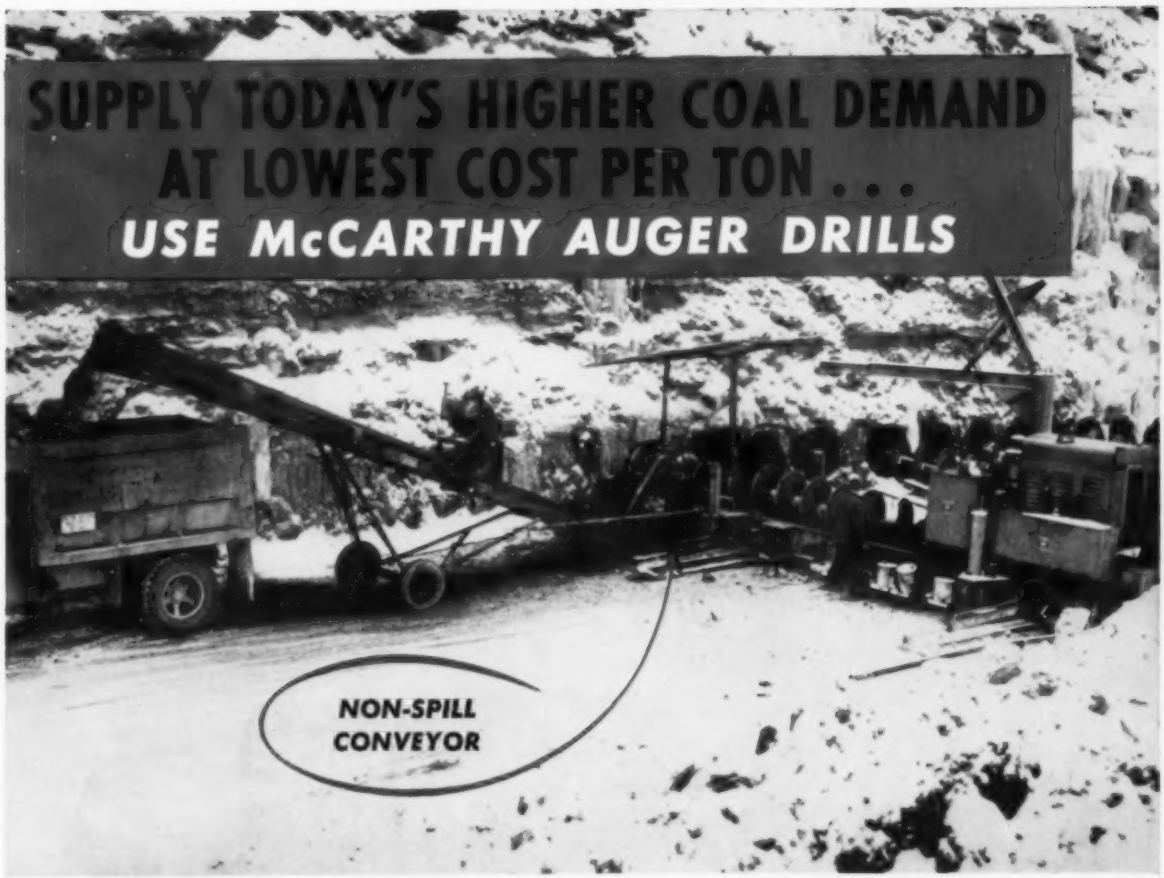
AC Recording Meters

The John W. Hobbs Corp., Springfield, Ill., has begun manufacturing a line of recording meters for AC-powered equipment. The meters are designed for 120, 240 and 480 v; 25, 50 and 60 cycles. Constructed in 10,000-hr and 100,000-hr models, the meters show ⅒ of an hour units. Its mechanisms, encased and sealed against dust and moisture, are powered by a synchronous motor. Accumulated time is registered on an odometer.

Interchangeable Ripper

A heavy duty bulldozer ripper, Model 2000-H, is being manufactured by Hensley Equipment Co., Inc., 800 Peralta Ave., San Leandro, Calif., as an interchangeable unit for tractors with blade heights from 39 to 61 in. Hensley says the ripper is interchangeable, for example, on the D-8, D-9, HD-19, HD-20, and TD-24. Other features include re-

SUPPLY TODAY'S HIGHER COAL DEMAND AT LOWEST COST PER TON . . .
USE McCARTHY AUGER DRILLS



HEAVY — RUGGED — POWERFUL

SELF-MOVING FROM HOLE TO HOLE

FINGER-TIP CONTROL

Gives Desired Rotating Speed Of Auger

HYDRAULIC FEED

Provides Any Speed Up To 6 Feet Per Minute Horizontal Feed Of Drill

Today's increasing demand for coal and the low operating cost of McCarthy Coal Recovery Drills is a profitable combination.

Two men operate the drill augering 60 to 75 tons of coal per hour with the McCarthy Model 1436—42x12 ft. drill pictured above. Holes are 42" in diameter; 144 ft. deep. This drill is equipped with McCarthy Safety Auger Guide which directs auger into coal seam without any climbing or jumping of auger.

Twelve different models of McCarthy Coal Recovery Drills mine this low-cost "bonus coal." Auger diameter ranges from 16 in. to 42 in.; auger sections are 6 ft., 12 ft., or 24 ft. long.

A new auxiliary conveyor—at the boring end—eliminates spillage at the hole. It operates from either side of the drill. This permits working right to the end of a blind cut. When the cut is open at both ends, it permits working from the side nearer to access roads, saving time and mileage for the trucks.

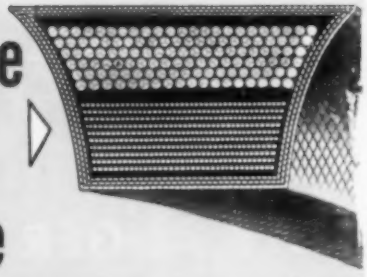
Contact your nearest Salem Tool Co. distributor, or write for Bulletins M-101 and M-102 for detailed information on the complete line of McCarthy Coal Recovery Drills.

MANUFACTURERS OF DRILLING EQUIPMENT SINCE 1901

THE SALEM TOOL CO.

763 SOUTH ELLSWORTH AVENUE · SALEM, OHIO, U. S. A.

Why this curve lengthens V-belt life



THE CONCAVE SIDES (U.S. Patent 1813698) of every Gates V-Belt are a precisely engineered curve. This curve greatly lengthens V-belt life for this interesting reason:

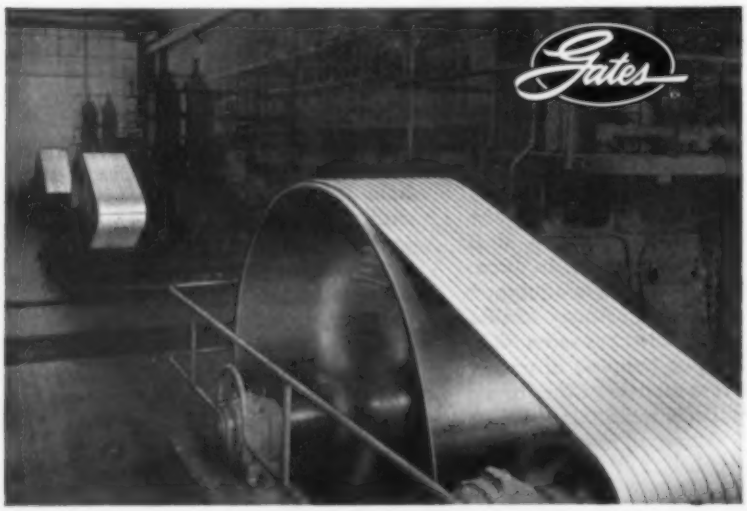
When you bend a Gates V-Belt, just as it is bent around a sheave, the concave sides (Fig. 1) become straight. Therefore, the belt makes full contact with the sheave, gripping the sides evenly (Fig. 1-A) and wear is distributed uniformly across the sidewalls of the belt. Naturally, uniform wear lengthens belt life; saves on replacement costs and cuts down-time.

Now see what happens when you bend a straight-sided belt. (Fig. 2) Just feel the sidewalls *bulge out* at the bend. The bulge causes *uneven* contact with the pulley, as in Fig. 2-A. And uneven contact causes excessive wear at points shown by arrows; belt life is shortened.

Cut costs by getting longer wear from your V-belt drives. Specify Gates Vulco Rope—the V-belt with concave sides. Your nearby Gates distributor will supply your needs promptly. The Gates Rubber Co.—*World's Largest Maker of V-belts.*

There are Gates Engineering Offices and Distributor Stocks in all industrial centers of the United States and Canada, and in 70 other countries throughout the world.

TPA-74



Gates VULCO ROPE Drives

Equipment News *(Continued)*

placeable, reversible, self-sharpening wear boots and a positive locking and holding yoke that the company says will not chip the ripper's cutting edge or break off while hardsurfacing.

Truck Wheel Chocks

A 14-lb wheel block designed with rounded edges, stiffening ribs and supporting members is being marketed by Calumet Steel Castings Corp., Hammond, Ind. Designated the WB2H "Standard Safety Wheel Block," the device has been equipped with cast gripper teeth and can be chained to a dock or a vehicle. Dimensions are 9x10x10 in. Calumet sells the block with or without a buyer's name cast on in raised letters.

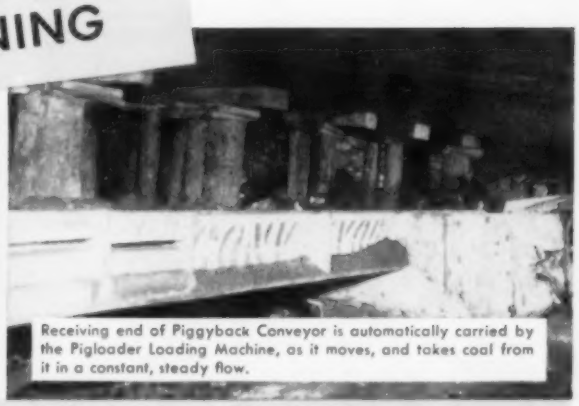
Precise Circuit Control

A general purpose time switch that will turn on and off circuits any time of day is being manufactured by General Electric, Schenectady 5, N. Y. The company recommends the switch (TSA-40) for precise time control. Its main feature is a so-called "shearing action" in which the instrument's contacts slide against each other as they open and close. General Electric says this prevents welding and will keep the contacts clean under overload conditions. For operator safety the switch has been equipped with a dead-front. With the terminal shield in place the switch's trippers can be adjusted or time can be set without contacting terminals accidentally. A 4-w "Telechron" motor, GE's own, operates the switch in temperatures from minus 50 to 150 F. Voltage is 120, 240 and 480 AC.

Another successful installation . . .

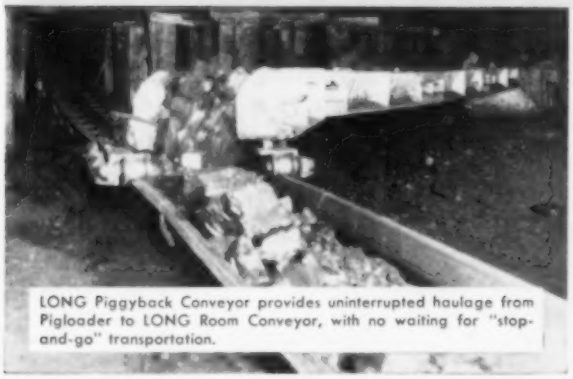
PIGGYBACK® CONVEYOR MINING

LONG Pigloader* Loading Machine, designed for heavy-duty, high-capacity operation, loads coal continuously from the face to the LONG Piggyback* Conveyor.



Receiving end of Piggyback Conveyor is automatically carried by the Pigloader Loading Machine, as it moves, and takes coal from it in a constant, steady flow.

Production boosted from 12 to 42 TPM with LONG Continuous-Haulage System



LONG Piggyback Conveyor provides uninterrupted haulage from Pigloader to LONG Room Conveyor, with no waiting for "stop-and-go" transportation.

LONG Stage Loader receives material from Room Conveyor and loads it onto belt conveyor . . . eliminates shooting of boom holes in coal as low as 28".

At this Kentucky mine, a six-man crew, utilizing the LONG Piggyback System in 36"-42" coal, is consistently producing 42 tons per man-shift (conveyor moves included). Prior to the installation of LONG equipment, production at this operation averaged out to only 12 tpm!

Results like these are typical with Piggyback Conveyor Mining. That's because this exclusive LONG development makes possible continuous transportation from the face to the outside. There are no delays whatsoever for car or buggy changes. In fact, with low-investment, low-maintenance Piggyback Continuous Haulage Mining, six hours or more loading time per shift is not unusual. If you would like more information on today's fastest growing method of mining, write us.

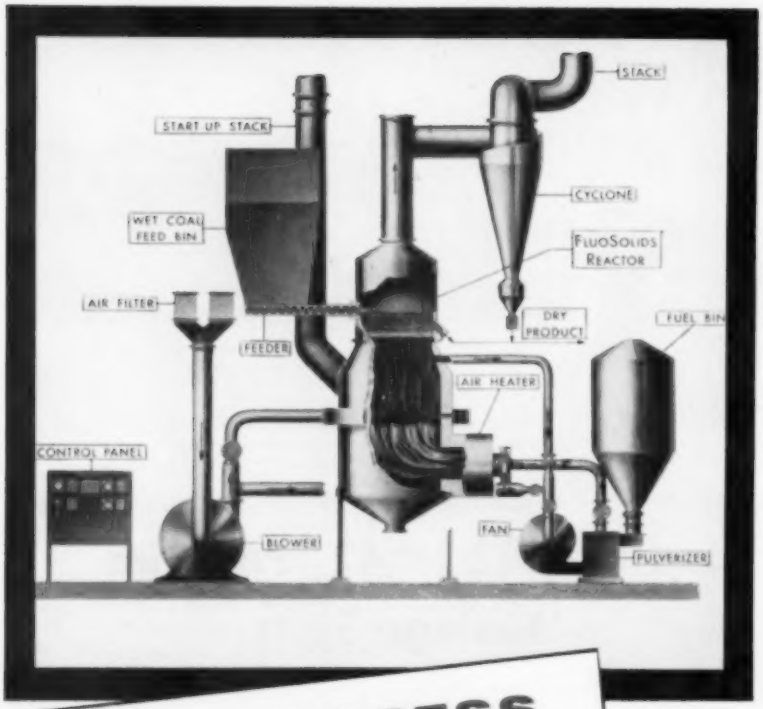
For details or a demonstration, write us today!

*Trade Marks

The **LONG** Company
OAK HILL, W. VA.

Developers and exclusive manufacturers of the Piggyback Conveyor System—America's fastest growing method of mining.

FLUIDIZED COAL DRYING



A PROGRESS REPORT...

The first Dorrco FluoSolids System for coal drying has been on stream since July, 1955. Operating information is now available to prove conclusively the advantages of fluidization compared with conventional thermal drying of coal. Located at Lynnville Coal Company, Lynnville, Indiana, the System has demonstrated that . . .

Steam Coal and Metallurgical Coal can both be dried successfully. Variations in sulfur from 0.6% to 4% and in inherent moisture from 3% to 9% have no effect on the operation.

Feed variations from 69 TPH to 107 TPH and total moisture variations from 10.1% to 22.4% are easily taken in stride.

Saturated stack conditions have prevailed during majority of operating time with relative humidity of the exit gases never dropping below 90% . . . indicating maximum air utilization and resulting in a clean stack.

100 tons per hour of ¼" x 0 coal is the average being handled and the entire drying system occupies only 1350 sq. ft.

If you'd like more information on this radical departure from conventional fine coal dryers, write for a copy of Bulletin No. 7503. Dorr-Oliver Incorporated, Stamford, Connecticut.

FluoSolids T.M. Reg. U. S. Patent Office

DORR-OLIVER
INCORPORATED
WORLD-WIDE RESEARCH • ENGINEERING • EQUIPMENT
STAMFORD • CONNECTICUT • U.S.A.

Equipment News *(Continued)*

To Light Your Way

An Edison "Four-Cell Trip Lamp" with a rating of 4.85 v at 1 amp is being manufactured by Mine Safety Appliances Co., 201 N. Braddock Ave., Pittsburgh 8, Pa. Approved by the U. S. Bureau of Mines, the lamp can be recharged on any Edison R-4 lamp charging rack without additional equipment. The lamp's bulb is enclosed in a heavy ruby glass cylinder and is protected by a steel-ribbed guard.

Holder Now a Lightweight

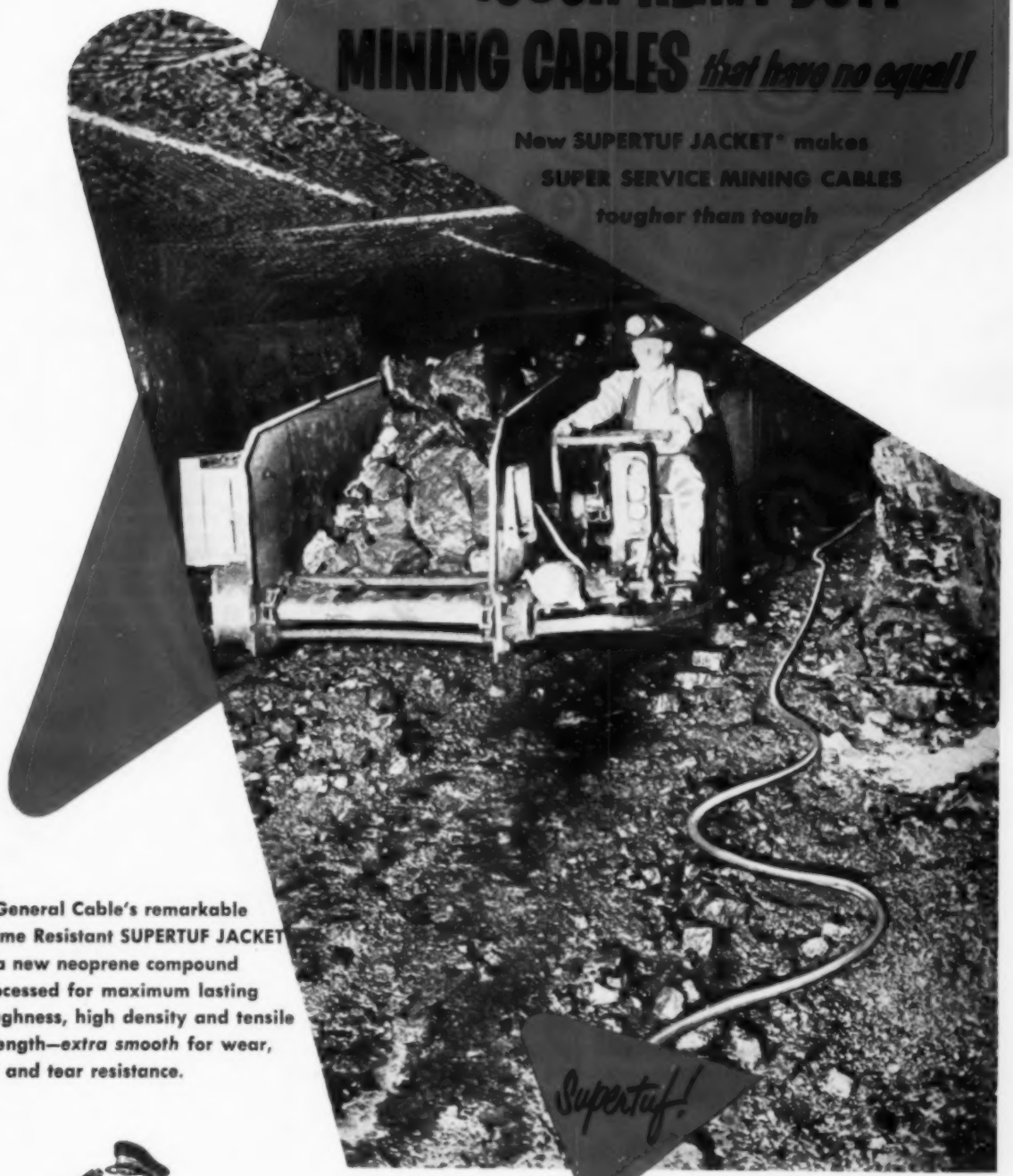
A lightweight arc welding electrode holder has been introduced by Tweco Products, Inc., P. O. Box 666, Wichita 1, Kan. Designated the AL-300 "Tweco-tong," the holder has been constructed with an aluminum body and aluminum upper lever. Its weight is 13½ oz, some 50% less than copper-constructed units. Welding cable is attached by baring the cable end and inserting it in a reamed hole in the holder's body. An allen screw holds the cable in place. Resin-bonded glass cloth has been used for insulation.

Respirators' Functions Vary

Four new respirators designed to protect against inhalation of all non-volatile, airborne particulate matter are being manufactured as additions to the R5000 series of the American Optical Co., Safety Products Div., Southbridge, Mass. In addition, each respirator provides specific protection against specific volatile dusts, sprays, mists, fumes, vapors and gases. One, the R5561, protects against airborne particulate composed of volatile organic substances and against organic vapors.

TOUGH HEAVY DUTY MINING CABLES *that have no equal!*

New SUPERTUF JACKET* makes SUPER SERVICE MINING CABLES *tougher than tough*

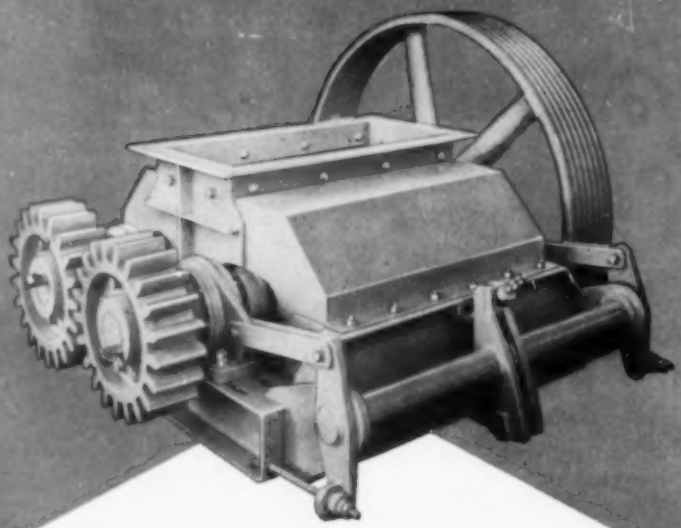


***General Cable's remarkable Flame Resistant SUPERTUF JACKET is a new neoprene compound processed for maximum lasting toughness, high density and tensile strength—*extra smooth* for wear, cut and tear resistance.**

General Cable... *at your service!*

GENERAL CABLE CORPORATION, 420 Lexington Avenue, New York 17, N. Y. Offices and Distribution Centers Coast-to-Coast

For low-cost crushing of COAL—LIME—CINDERS—and similar materials



the McLANAHAN

Black Diamond

DOUBLE ROLL CRUSHER

Designed as a relatively inexpensive yet sturdy crusher for accurate sizing of the crushed product, the McLanahan Black Diamond Double Roll Crusher is available in 18", 24", 30" and 36" diameter rolls with roll widths from 18" to 60" for handling various feed sizes and capacities. Cast steel or semi-steel gears with extra long teeth provide adjustments in crusher opening. Anti-friction bearings.

Write today for Bulletin BOOR-255

McLANAHAN & STONE CORPORATION

PIT, MINE AND QUARRY EQUIPMENT HEADQUARTERS SINCE 1835

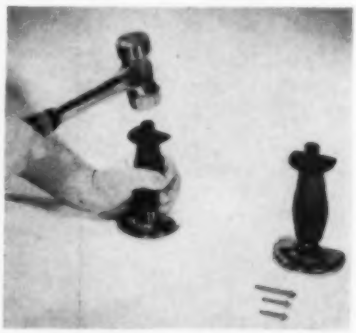
250 Wall Street, Hollidaysburg, Pennsylvania

Equipment News *(Continued)*

Another, the R5562, protects against acid gases. A third, the R5563, protects against inhalation of organic vapors, acid gases and airborne particles that decompose into organic and acid vapors and gases. A fourth, the R5564, protects against inhalation of alkali gases.

Steam, Hot Water Hose

A wire braid hose constructed with white neoprene as a cover has been added to the "Revelation" brand of hoses produced by the Hamilton Rubber Mfg. Co., Trenton, N. J. Named "Wash Up," the hose has been designed for flexibility under high pressure hot water and steam conditions. Its inner tube is made of a heat-resisting compound and its steel wire-enforced carcass is designed to prevent bursting. Constructed in ½-, ¾- and 1-in sizes, the hose will handle saturated steam up to 150 lb per sq in, according to the manufacturer.



For Light Fastening

"Shure-Set," a fastening tool being sold by Ramset Fastening System, Olin Mathieson Chemical Corp., is recommended by the company for 158 different light fastening uses. Constructed with a base plate that is designed to level the tool at right angles to the work and to protect surfaces from poorly directed hammer blows, the tool will seat a fastener into a number of materials, including light steel and concrete, the company declares.

Eccentric Lock Mounts

SKF Industries, Front St. & Erie Ave., Philadelphia 32, Pa., has added a pillow block and a flanged mounting for anti-friction bearings to its line of bearing mounts. Named the Type SYH-X Unit Pillow Block and Type FY—X Unit Flanged Mounting, the two new products are of the eccentric lock type and

HAUL

HAUL at high capacity.

HAUL the low-cost way.

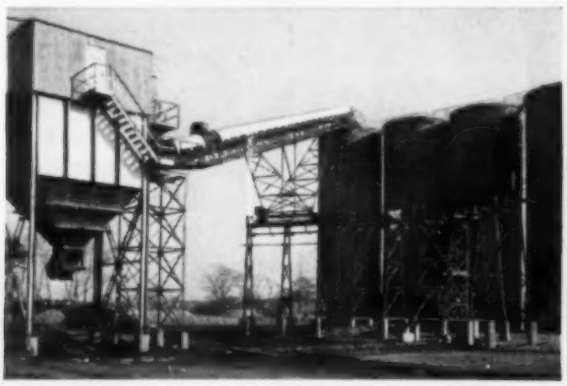
HAUL with less maintenance.

HAUL anywhere—above ground or below ground . . . from mine to classifying plant, to storage, to car, barge or truck.

HAUL with standardized, pre-engineered Barber-Greene Conveyors.

Barber-Greene standardized conveyors permit faster quotation and delivery, lower cost erection, easier future alteration. Pre-engineered components include: Frames, Trusses, Drives, Take-ups, Feeders, Hoppers, Brakes, Housings, Supports, etc. Ask for the Barber-Greene 192-page Conveyor Catalog.

Over 4,300′ of Barber-Greene Belt Conveyors handle 45,000 to 55,000 tons of coal each month at the Sauceda mine in Palau, Mexico. These conveyors move the coal to the transfer bin for loading, to the stacker for stockpiling and reclaiming . . . or to the processing plant.



This 119′ Barber-Greene Stacker pivots on a curved track to deliver up to 250 tons per hour to any of five silos. Built for the Chicago Wilmington & Franklin Coal Company, this Barber-Greene installation has a capacity that can be quadrupled when required.

55-22A-UPE

Barber-Greene BG

AURORA, ILLINOIS, U.S.A.

CONVEYORS . . . LOADERS . . . DITCHERS . . . ASPHALT PAVING EQUIPMENT

This Coal Washing Efficiency Makes Sense

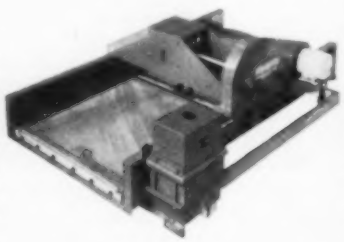
It's easy to believe you should take a good look at any fine coal washing process that promises to save money.

When that process assures the utmost in performance efficiency, your "look" becomes a "must." Maximum cleaning efficiency at lowest cost is exactly what you get when you employ the SuperDuty® DIAGONAL-DECK® Coal Washing Table. Singly or in battery this efficient table provides optimum elimination of the free impurities such as slate and pyrite. The result is exceptionally clean coal with negligible loss to the refuse at cleaning efficiency of 98% or better.

Yes, SuperDuty table efficiency makes sense. For detailed information send for Bulletin 119.

FOR SCREENING ECONOMY

All Leahy® screens provide differential vibration that snaps oversize wedging particles loose 1600 times per minute. When dust is a problem, totally enclosed models are available. For damp screening, FlexElex electric heating of the screen jacket insures full-time open mesh. For wet screening CONCENCO® spray nozzle arrangements are added.



THE DEISTER ★
CONCENTRATOR
COMPANY
903 Glasgow Ave. • Fort Wayne, Ind., U.S.A.
CONCENCO PRODUCTS

★ *The ORIGINAL Deister Company* ★ *Inc. 1906*

Equipment News *(Continued)*

thus extend the use of positive seal mounts to applications where an eccentric lock is wanted. The SYH-X also has a reduced center height to permit its use where space is limited.

Six-Wheel Trucks

Tandem-axle, six-wheel trucks ranging from 31,000 to 46,000 lb maximum gross vehicle weight and up to 65,000 lb maximum gross combination weight have been introduced by Dodge, Detroit 31, Mich., as a new line. The trucks are equipped with V-8 engines up to 220 hp and are offered in wheelbases from 141 to 192 in. All models are offered with 5-speed transmissions, but 3-speed auxiliary transmissions are available as optional equipment.

Battery With 1,000 Lives

Dynaseal Light Corp., 5 Hadley St., Cambridge 40, Mass., says the battery of its new "Dynaseal Lifetime DY-1006" emergency light can be recharged 1,000 or more times and can be connected with 10 remote assemblies situated 100 ft away or more. The hermetically sealed battery requires no liquid or refilling, the company says.

Gas Detective

A hand-operated instrument for detecting hydrogen sulfide is being sold by Mine Safety Appliances Co., 201 N. Braddock Ave., Pittsburgh 8, Pa. The instrument is equipped with a dual scale to provide readings in percentages by volume or by grains per 100 cu ft. A standard detector begins measuring at zero, ends at 25 grains per 100 cu ft.

Market forecast:

More profit per ton with a new CAT* No. 12

This Caterpillar No. 12 Motor Grader keeps its new-machine efficiency as the hours roll by. It is used for haul road construction and maintenance by The Big Horn Coal Co. near Sheridan, Wyo. In addition, the versatile No. 12 can level the fill at old mined-out pits, maintain haul roads and do general clean-up work. This company is ready to take advantage of an improving coal market with well-kept haul roads and good equipment. There are also six Caterpillar rubber-tired Tractors and two D8s on the job here.

In line with its policy of continuous product improvement, Caterpillar has announced several important new features for its motor graders. For example, the new oil clutch lengthens clutch life and reduces the need for clutch adjustment. And tubeless tires, now standard on all Cat Motor Graders, increase tire life and eliminate an estimated 80% of down time caused by conventional tires.

All Caterpillar Motor Graders are built—not just assembled—by a single manufacturer. This means a careful balance between engine power, blade capacity and working speed for greater efficiency and longer life. It also means a single, dependable source for parts and service: your Caterpillar Dealer.

Operators like Caterpillar Motor Graders for their positive, non-creep mechanical controls, unexcelled visibility, easy-to-change blade positioning and simple maintenance. There's a Caterpillar Motor Grader that can do *more work* at *less cost* on *your* job: the big 115 HP No. 12, the 75 HP No. 112, or the 50 HP No. 212. See your Caterpillar Dealer for full details and an on-the-job demonstration.

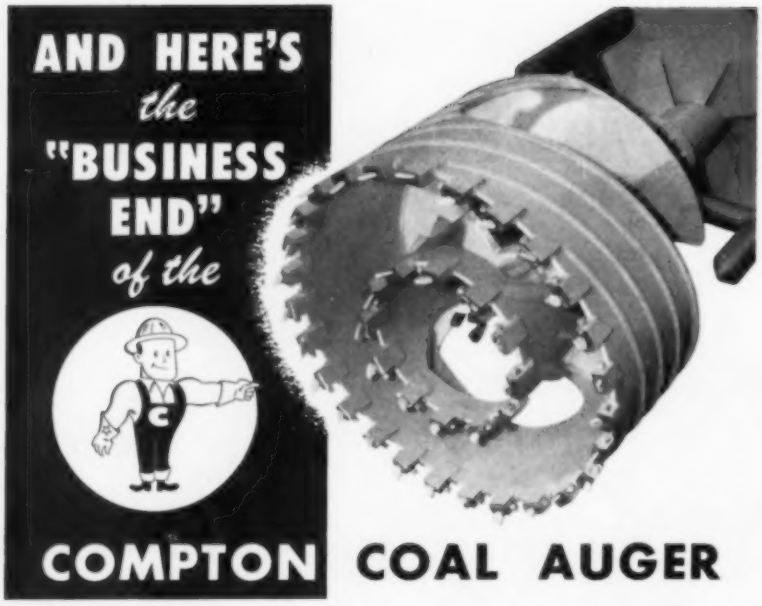
Caterpillar Tractor Co., Peoria, Illinois, U.S.A.

CATERPILLAR*

*Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.

99% OF ALL CAT MOTOR GRADERS ARE STILL IN USE

AND HERE'S *the* "BUSINESS END" *of the*

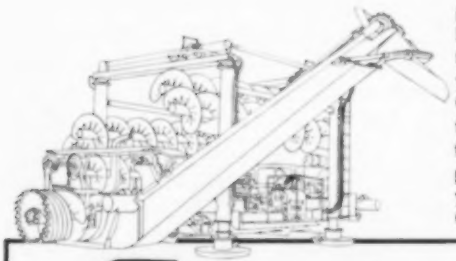


COMPTON COAL AUGER

● Just stop for a moment and study this photo of the Compton patented Lump Recovery Head . . . it certainly looks formidable even in print!

This non-clogging head was developed by Compton for exclusive use on the Compton Coal Auger. Driven by a power-packed diesel engine, the Compton Auger Head, with its top efficient core breaker, is a wonderful sight to behold as its 32 carbide tipped cutting bits cut and auger their way into the seam of coal in a jiffy.

A built-in spider bearing assembly provides "compass-straight" drilling with very little frictional drag. Engineered to cut coal at high speed, the Compton Lump Recovery Head will not clog and turns out a steady stream of coal from head to truck. Head diameters vary, depending on the size auger, from 44" to 28". The peripheral speeds maintained for all diameters makes it possible to get large tonnages even with the smaller diameter augers.



A Compton Coal Auger plus the Compton Lump Recovery Head will contribute to the efficiency of your operation. Call a Compton sales representative today . . . he is qualified to advise you on the possibilities which exist on your property for profitable Compton Auger Mining.

Compton, Inc.

ORIGINATORS OF COMPTON LUMP RECOVERY HEADS

BOX 1946 ● TELEPHONE 4-6384

CLARKSBURG, WEST VIRGINIA

Equipment News *(Continued)*

Measuring in percentages, concentrations as low as .0025% and up to .04% by volume can be recorded. A "Supersensitive Detector" measures hydrogen sulfide in ranges beginning at zero and up to 50 parts per million by volume and from zero to 3 grains per hundred cu ft.

Fill And Hoe In One

A combination back-hoe and back-fill blade attachment for the International 300 tractor is being manufactured by the Wain-Roy Corp., Hubbardston, Mass., for trenching, bell hole and foundation excavation, backfilling, leveling and grading. The combination pieces are attached to a sub-frame which is designed to relieve the tractor of heavy loads. Removal takes 30 min or less, Wain-Roy says. The hoe digs to 11 ft and dumps or digs in a 190 deg radius. The 6-ft backfill can be raised hydraulically from 18 in above a grade to 8 in below.

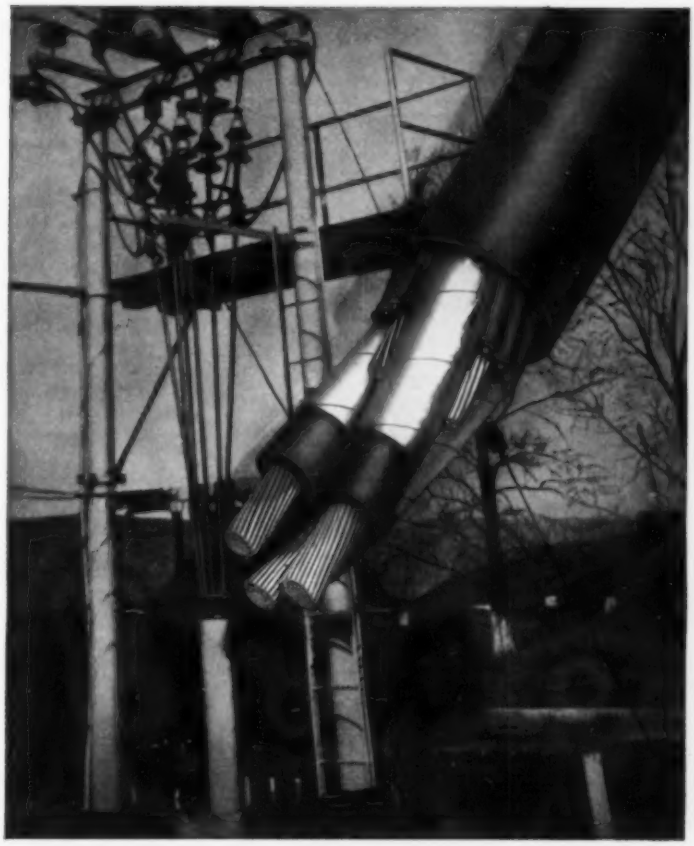
Hydraulic Tube Fitting

The Weatherhead Co., Fort Wayne Div., 128 W. Washington Blvd., Fort Wayne, Ind., is producing a 7000 Series "Ermeto" high-pressure, flareless, straight-thread hydraulic tube fitting. Features: a design for minimum close coupling; ease of assembly; a positive seal; a phosphate finish which is said to be resistant to non-inflammable hydraulic fluids as well as petroleum base fluids; a design for use with the SAE "O" ring boss. Weatherhead makes the fitting in sizes ⅛ to 2 in.

Collector's Draft Induced

Breslove Separator Co., Commonwealth Bldg., Pittsburgh 22, Pa., has introduced a fly ash collector and an induced draft fan that the company has manufactured as a single unit. In operation

KEYSTONE-HAZAPRENE mine power cable:



provides full protection for all types of distribution circuits

Keystone-Hazaprene Mine Power Cable is a non-metallic armored, shielded, high-voltage cable that provides a simple solution for virtually every mine power distribution problem. It can be suspended vertically in borehole or shaft, run horizontally in underground entries or suspended from messenger and supporting insulators. Design of the cable permits direct burial in trenches or installation on the mine floor, since it is highly resistant to the action of mine water and abrasion. In addition, the cable, classified as semi-portable, is easy to move and handle at all times.

Keystone-Hazaprene Mine Power Cable conductors are covered with Semicon tape to prevent internal corona cutting. The Keystone high-voltage insulation is resistant to heat, moisture and ozone, giving maximum service life under all conditions. Cable tape on each insulated conductor is colored for permanent identification. Copper shielding tape provides ground fault protection over each conductor, and bare ground wires in contact with the shielding assure low-resistance ground in the event of shielding failure or ground fault in the equipment.

Hazaprene fillers in the interstices prevent wicking-in of moisture and make possible a tight-fitting, compact construction that will resist abuse and improve flame resistance. A Hazaprene sheath overall protects the cable against abrasion, moisture and other dangers of mine service.

Complete information on mining cables is available from your Okonite representative or write The Okonite Company, Passaic, N. J.

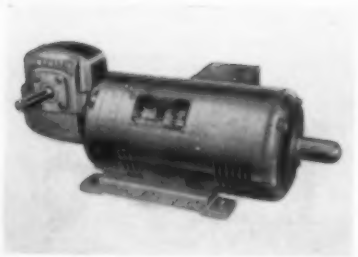
2191-A

where there's electrical power . . . there's **OKONITE CABLE**

the collector converts entering gas pressure, or "draft," to "velocity" in an accelerating zone. The gas is whirled at high speed to centrifugally route suspended particles. Finally, the unit reconverts centrifugal velocity back to pressure for expulsion (draft again) of the cleaned gas. Solid matter is carried out into an outer shell of the collector. Units are made for horizontal or vertical flow. Several, the company says, are being used with coal slack driers.

Reducer, Drive Now One

The Dynamatic Div., Eaton Mfg. Co., Cleveland 10, Ohio, says it has an adaptable speed, fractional horsepower drive with integral speed reducers to meet any slow speed requirements. The drive is named "Ajusto-Spede" and the company says that reductions from 5:1 to 100:1 can be produced, depending upon the drive horsepower rating. The drive consists of an AC constant speed induction motor, an eddy-current coupling, a speed reducer and an electronic control. One connection to a standard power



line is the only source of current needed. All models have a continuous torque rating through a 25:1 speed range. The electronic control, declares Dynamatic, insures speed stability of plus or minus 2% of top speed at any point within operating range.

Large Coal Company in Southern West Virginia Operates 34 NOLAN PORTA-FEEDERS

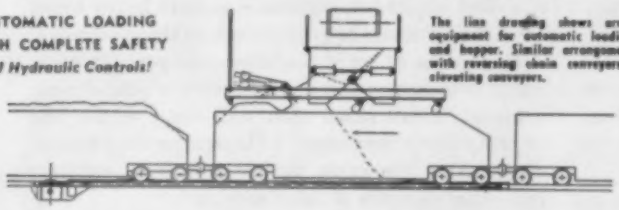
The trend is to the PORTA-FEEDER! More *new* orders . . . more repeat orders . . . in greater volume than all other similar types of feeders combined! 34 sold to one operator as a result of first PORTA-FEEDER installed!

TWO MODELS:
1. **Direct Mechanical Drive**
2. **Hydraulic Cylinder Type Hose Coupled to Remote Power Unit (Shown in illustrations)**

These two Nolan models will help you meet every requirement and condition in spotting cars for loading . . . *and can save you many shift hours per day!* The Porta-Feeder mounts between the rails on top of the track ties, and is secured by rail clamps. No excavation or preliminary foundation work is necessary. There are no ropes or cables. Reciprocating pushing dogs deliver constant forward feeding motion.

The Nolan Porta-Feeder has been in successful use in many mines for over ten years. We will be glad to show you a mine in your vicinity where the Nolan Porta-Feeder is operating. Write us now.

AUTOMATIC LOADING WITH COMPLETE SAFETY
All Hydraulic Controls!



The line drawing shows arrangement of equipment for automatic loading from belt and hopper. Similar arrangements are used with reversing chain conveyers (payac) and elevating conveyers.

NOLAN SALES AGENTS:
- George C. Hutchinson, Jr., 1304 Keenan Bldg., Pittsburgh, Pa.
- Huntington Supply & Equipment Co., Guaranty Bank Bldg., Huntington, W. Va.
- John Lloyd & Sons, 33 Bennett Bldg., Wilkes-Barre, Pennsylvania
- E. C. Herne Machinery Co., 1736 Champa Street, Denver 2, Colorado
- Frank C. Monmonett, P.O. Box 154, Castle Gate, Utah
- Ames A. Culp, 429 South 20th Street, Birmingham 5, Alabama
- John North Associates, P.O. Box 105, Harbert, Mich. (Chicago District)

NOLAN

THE NOLAN COMPANY
106 Pennsylvania Street • Bowerston, Ohio

Equipment Shorts

PARTS WASHER – "Amasco" parts washing machines, manufactured by the American Machine & Solvents Co., 11 Centre Pl., Yonkers, N. Y., combine chemical actions of cleaners with the mechanical action of up-and-down agitation. Built for heavy industrial use, the washers can handle 50 to 2,500 lbs a load. Manufactured with steam, gas and electric heat, or unheated.

FITTING CLEANER–"Ram-O," a hand tool manufactured by Gaskins & Stockman, 2369 Mountain Ave., La Crescenta, Calif., is said to free frozen zinc-type fittings by exerting hydraulic pressure as high as 1,000 psi when the tool is tapped with a 5-lb hammer. After filling the "Ram-O" with motor oil an operator can clear out dirt, rust or hardened grease, unless a bushing has been turned to block the opening.

WINDINGS INSULATION–"Thermalastic" insulation, standard wrapping for AC machines constructed by Westinghouse Corp., 401 Liberty Ave., Box 2278, Pittsburgh 30, Pa., is being applied to the company's DC machines.

ELECTRODES–Although designed for fast production and fabrication welding, "Hobart 212," is good for maintenance welding, too, according to Hobart Bros., Hobart Square, Troy, Ohio. For AC or DC operation, the electrodes (E-6012) are recommended for use where fit up is poor. Little spatter occurs, the company says, even when higher than normal amperages are used.

DIRECTIONAL VALVES–Solenoid operated, solenoid controlled and pilot operated directional valves for industrial oil-hydraulic systems are being sold by Vickers, Inc., Detroit 32, Mich. Made to meet a wide range of control requirements, the valves feature simple wiring and simple installation.

CONDUCTOR IDENTIFICATION – General Cable Corp., 420 Lexington Ave.,

There's **MORE** Cooling Surface in these deep-ribbed **MOTORS**

No Day is FRYDAY

with these Allis-Chalmers MOTORS

● Frying of insulation is impossible under normal conditions with the extra-large cooling surface of Allis-Chalmers rib-type TEFC motors. The result—you expect and get longer motor life.

The engineered partner of A-C motors is Allis-Chalmers control.

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ALLIS-CHALMERS

A-C ALLIS-CHALMERS

A-4940

1 NEW—1¾" stop. Prevents bit from being jammed in the lug. Assures accurate positioning.

2 NEW—Radiused nose. Provides maximum clearance for shank. Gives cleaner, easier cutting action.

3 NEW—Stronger carbide tip. Brazed on three sides to resist severest strains.

New design features, plus gauge stop to prevent jamming in the lugs . . .

New Carboloy CCS-1 Medium-Duty Bit gets more tonnage at lower bit cost

The new Carboloy® CCS-1 has all the economy advantages of the rugged Carboloy CC-1 . . . plus a few more of its own.

The CCS-1 Medium-Duty Bit has a 1¾" stop to prevent jamming in the lugs. It uses a new radiused nose design for smoother, freer cutting action. And, it has a carbide tip that can take any cut in stride.

Cutting machines tooled with the CCS-1 produce more tonnage per shift – because this new bit cuts easier, stays sharp longer. Machines draw less power – because the CCS-1 uses the same narrow cutting edge and top rake angle that made the CC-1 so economical to operate.

The CCS-1 is designed to give regrind after regrind, under all types of conditions. It can be used in all machines using ½" x 1" bits.

This bit, like all the tools in the complete Carboloy line, is locally stocked for immediate delivery. For prices, specifications, or expert assistance on carbide tool problems, call your Authorized Carboloy Mining Tool Distributor. You'll find his name listed on the opposite page.

"Carboloy" is the trademark for products of the Carboloy Department of General Electric Company

CARBOLOY

DEPARTMENT OF GENERAL ELECTRIC COMPANY

11120 E. 8 Mile Ave., Detroit 32, Michigan

Equipment News *(Continued)*

New York 17, N. Y., is furnishing a new color coding for individual rubber insulated, neoprene-jacketed conductors of multiple conductor power and control cables. Brighter colors are expected to insure positive identification.

TRUCK MUFFLER—A 125-sone muffler has been made standard equipment on R-line trucks, a line manufactured by International Harvester Co., 180 N. Michigan Ave., Chicago 1, Ill. The muffler is designed to comply with minimum noise restrictions established in a number of cities and states.

NOISE ANALYZER—An electronic, portable instrument named the "Soundscope" by its manufacturer, Mine Safety Appliances Co., 201 N. Braddock Ave., Pittsburgh 8, Pa., measures overall sound levels, analyzes sound in each of eight octave bands and determines noise peaks and checks sounds in narrow frequency bands. MSA says the instrument takes the place of four individual units previously required to analyze noise.

OILS — Socony-Mobil Oil Co., 26 Broadway, New York 4, N. Y., is marketing what it calls "balanced" oils that "stay young." Marketed under the name Mobil D.T.E., the oils (8) were developed to lubricate during most of a machine's service life.

Free Bulletins

PUMPS — "Wheeler-Economy" double suction, single stage centrifugal pumps are the subject of Catalog A-156, distributed by C. H. Wheeler Mfg. Co., 19th & Lehigh, Philadelphia 32, Pa. The pumps are recommended for general service and where low-viscosity liquids must be moved.

FILTERS—Lowering costs and a new line of IWF filters are featured in Bulletin 651 published by R. P. Adams Co., 225 E. Park Drive, Buffalo 17, N. Y. Included are case histories on recirculating pond waters.

RIFFLE BUCKETS — Instructions for using riffle buckets are being distributed by Gichner, Inc., Instrument Div., 1900 Kendall St., N.E., Washington 2, D. C. Three major points are listed. Bucket position is illustrated. Gichner makes 30-lb buckets in pairs using galvanized iron.

MINING TOOLS—Thor Power Tool Co., Aurora, Ill., is distributing Catalog 44, a 68-p booklet that lists its complete line of mining tools. Included: wagon drills, utility hammer, claydigger, sinker rock drills, crust breaker, push-feed drill and a number of electric and air tools. Thor is also distributing Catalog 39-C, illustrating the company's line of "Silver Line" and "Speed Tool" electric tools. e.g., impact wrenches, sander, saws.

MECHANICAL RUBBER PRODUCTS—Although Boston Woven Hose & Rubber's new catalog is aimed at the construction industry, coal men will find useful information in the company's breakdown descriptions of belts, air, dredging, water, steam and concrete hose. Dept 3391E, P. O. Box 1071, Boston 3, Mass.

REAR-DUMP TRUCK — Euclid's R-15 rear-dump (15- or 18-ton rating) climbs a 40.5% grade in first gear at 2.4 mph, a 2.5% grade in fifth gear at 24.7 mph, according to an 8-p catalog being distributed by Euclid Div., General Motors Corp., Cleveland 17, Ohio.

PLANETARY GEAR TRANSMISSIONS —American Gear & Mfg. Co., Lemont, Ill., has issued an 8-p bulletin containing information about seven models of the company's "Plan-Gear Transmission." The bulletin suggests possible uses, gives design data and describes operation.

ROLLER BEARINGS — Catalog 55, a 72-p issue published by the Chain Belt Co., Milwaukee 1, Wis., contains specification and data on all models of Shafer "Self-Aligning" roller bearings in shaft sizes ¾ in to 7 in. The principle of "Self-Aligning" (concave rollers running between convex raceway) is described.

CAR SWITCHER—"Switchmobile," LeTourneau-Westinghouse entry in the diesel railroad switcher line, is the subject of a 24-p bulletin being distributed by the company. The rubber tire-mounted machine's counterpart, the "Switch-Tractor," shares space.

WIRE ROPE—More than 120 wire ropes are covered in "Wire Rope Recommendations for Industrial Services," a 24-p bulletin (DH-128D) being distributed by American Cable Div., American Chain & Cable Co., Wilkes-Barre, Pa. Each recommendation covers rope diameters, construction, pre-forming, lay, grade and core.

EARTH-MOVERS—A pocket-size review of the earth-moving and construction machinery manufactured by Allis-Chalmers Mfg. Co., Construction Machinery Div., is available from the company's Tractor Group. Booklet MS-1107 describes the line and matched equipment. i.e., tractors, graders, scrapers and power units.

OVERHEAD CONVEYING—The "Coburn" line of overhead conveying equipment and hardware (chain hoists, monorail carriers, continuous conveyors, locks, switches, transfers) is described in a bulletin available from Colorado Fuel & Iron Corp., Wickwire Spencer Steel Div., 575 Madison Ave., New York, N. Y.

WIRE ROPE SLINGS—Revised bulletin (Slings for Industry) published by Macwhyte Co., Sling Dept., Kenosha, Wis., contains safe load information on slings in 20 sizes of wire rope. Information covers slings from a ½-ton safe load to a 48.7-ton safe load.

Carboloy Mining-Tool Distributors

Your local Carboloy Mining-Tool Distributor is listed below. His complete stocks guarantee you *immediate* local delivery.

ALABAMA
Birmingham 2—Shook & Fletcher Supply Co.

COLORADO
Denver 17—Mine & Smelter Supply Co.

ILLINOIS
Mt. Vernon—Central Mine Supply Co.

INDIANA
Terre Haute—The Mine Supply Co., Inc.

KENTUCKY
Harlan—General Electric Supply Co., Div. of General Electric Distributing Corp.
Harlan—Kentucky Mine Supply Co., Inc.
Madisonville—Central Mine Supply Co.
Paintsville—Farmer's Supply Co.
Pikeville—Big Sandy Electric & Supply Co., Inc.

NEW YORK
Buffalo 23—Austin Ford Logan, Inc.

OHIO
Cambridge—Cambridge Machine & Supply

OREGON
Portland—J. E. Haseltine & Company

PENNSYLVANIA
Johnstown—General Electric Supply Co., Div. of General Electric Distributing Corp.
Pittsburgh—General Electric Supply Co., Div. of General Electric Distributing Corp.
Washington—Fairmont Supply Co.

TENNESSEE
Knoxville—Crowell Engineering & Sales Co.
Knoxville—W. J. Savage Company

TEXAS
El Paso—El Paso Saw & Belting Co.
El Paso—Mine & Smelter Supply Co.

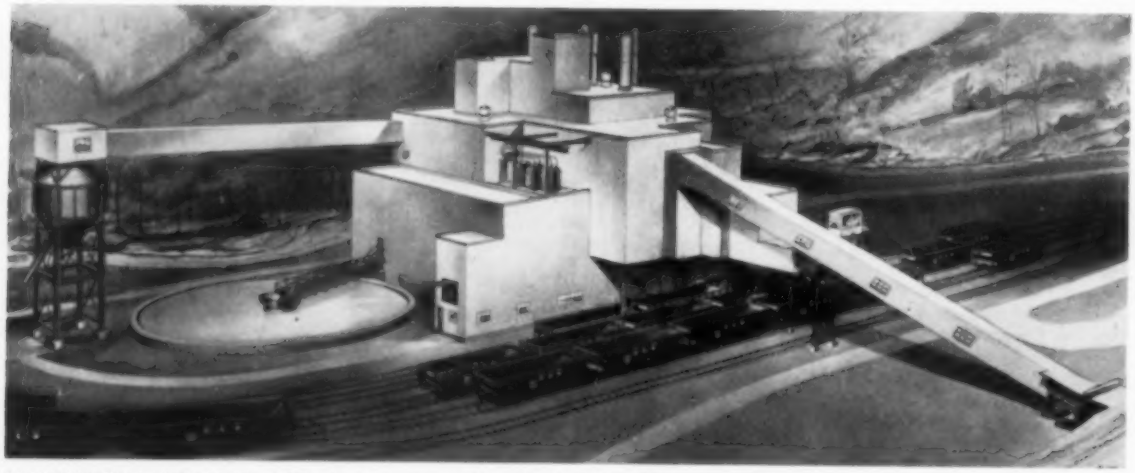
UTAH
Salt Lake City 1—Mine & Smelter Supply Co.

VIRGINIA
McClure—Erwin Supply & Hardware Co.

WEST VIRGINIA
Bluefield—Bluefield Supply Co.
Bluefield—Rish Equipment Company
Charleston—Rish Equipment Company
Clarksburg—Rish Equipment Company
Fairmont—Fairmont Supply Company
Montgomery—Marathon Coal Bit Co.
Shinnston—Erwin Supply & Hardware Co.

CARBOLOY
DEPARTMENT OF GENERAL ELECTRIC COMPANY
Detroit 32, Michigan

NEWS ROUND-UP



CLINCHFIELD COAL'S Moss No. 2 mine preparation plant as it will appear when construction is completed. Situated at Clinchfield, Va., the plant will feed some of the Moss mine coal to Appalachian's Clinch River station, but the coal company plans to develop a new mine to serve Clinch River. The plant will produce 5,000 tpd.

AGE To Construct 450,000-Kw Units

WITH THE GOOD WISHES of everyone who had come to watch, from Virginia's former governor, John S. Battle, to the Lebanon, Va., high school band, Appalachian Electric Power, member company of the American Gas & Electric System (AGE), launched construction of its 450,000 kw, twin-unit, $55 million Clinch River power plant May 17 during ground-breaking ceremonies near Carbo, Va.

The construction launching was the second big announcement from AGE in little more than two weeks. On May 1 Philip Sporn, its president, had declared that AGE would install two more 450,000-kw, coal-burning plants at locations still unchosen. One difference, a big one, will move them up and out of the Clinch River class, despite the equal capabilities of all three. Instead of developing 450,000 kw through two units developing 225,000 kw each, the plants will rely on single units to produce the entire output. In short, the projected plants eclipse Clinch River, since they will be the largest single-unit constructions ever undertaken. Each of the plants will also cost $55,000,000, the same price as the Clinch River plant, and each will be part of a 2.6 million kw expansion announced by AGE in March (*Coal Age*, April, p 114).

At Clinch River where AGE and Appalachian have begun to spend the $55 million allocated, the money is being exchanged for twin turbine-generators that will provide 225,000 kw each and will be capable of supplying electricity for 650,000 average homes. Two out-door type boilers, 10 stories high, will provide steam for turbines at 2,000 psi at a temperature of 1,050 deg. A stack 500 ft high will serve the plant and four cooling towers 281 ft long, 67 ft wide and 61 ft high with a capacity of 55,000 gpm will supply water for steam-condensing.

Fuel needs at Clinch River, and at the projected single-unit plants, will be big, too. Upon completion in 1958, Clinch River will begin burning coal at an annual rate of 1,300,000 tons. Identical amounts will be needed for the single-unit plants.

Situated in the middle of huge coal reserves owned by the Clinchfield Coal Corp. the Clinch River plant has been guaranteed 40,000,000 tons by the coal company over the next 30 yr. With its new, wealthy customer safely stowed in a contractual pocket, Clinchfield Coal has embarked on ambitious expansion plans of its own. In Clinchfield, Va., it is constructing one of the most modern and complete coal washing, drying and preparation plants in the coal industry (photo) to serve its Moss No. 2 mine and another mine yet to be developed. Clinchfield says the as yet undeveloped mine will serve the Clinch River plant.

Meanwhile, the precisely-dealing Mr. Sporn released a series of record-making specifications for the projected single-unit plants that seemed to dwarf the already big Clinch River units. "Each of them," he said, "with the equivalent of more than 600,000 hp, will be 73% larger than any single power unit operating today anywhere in the world; each will be capable of supplying all the residential electric requirements of a city with a population of 4,000,000; each will consume 1,300,000 tons of coal a year; and each will utilize 3,000,000 lb of steam an hour at the above-critical pressure of 3,500 lb psi."

More, the single-units will be equipped with boilers as high as 23-story buildings. Turbines will be of the cross-compound type, the high pressure element operating at 3,600 rpm, the low pressure element at 1,800 rpm.

Commenting on "The American Gas & Electric System's decision to go ahead with super-sized, super-pressured, coal-fired units," Mr. Sporn said: "AGE is

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MONARCH WHYTE STRAND WIRE ROPE BY MACWHYTE

Wherever you put wire rope to work, you need rope designed and made to earn its way on your toughest requirements, under severest service conditions.

To provide you with exactly the *right* rope for each requirement, MONARCH WHYTE STRAND is made in every wire rope classification, PREformed and Internally Lubricated, Lang Lay or Regular Lay, with Fiber Core or Independent Wire Rope Core.

Put MONARCH WHYTE STRAND to the test on your equipment, you will be more than pleased with its performance.

There is a size and construction to meet each standard and special requirement of mining machines, hoists, and stripping equipment.

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Constant savings 9 ways!

1 **NON-STOP LOADING** is permitted by the new revolutionary articulated design which eliminates space between cars.

2 **NON-STOP DUMPING** is provided by acf's maintenance-free drop bottom cars.

3 **NO SPILLAGE** during loading or fast "runs".

4 **NO WIDE "TURNOUTS"** or extra timbering are needed because of reduced overhang.

5 **LESS MAINTENANCE** is required because special trucks, one set per two cars, eliminate flange wear and side play... assure perfect wheel alignment even on curves.

6 **SHORTER TRAINS AND FEWER CARS** are possible because no space is wasted between the long, extra-capacity cars.

7 **SHUT DOWN PROOF** operation is assured because a damaged car can be repaired while the rest of the trip goes on working.

8 **TWO-WAY PAY LOADS:** same trip can bring out the coal and take in supplies.

9 **GREATER FLEXIBLITY:** capacity of new type cars can be varied to meet your particular needs... later on, your entire haulage system can be easily modified to meet new demands of production.

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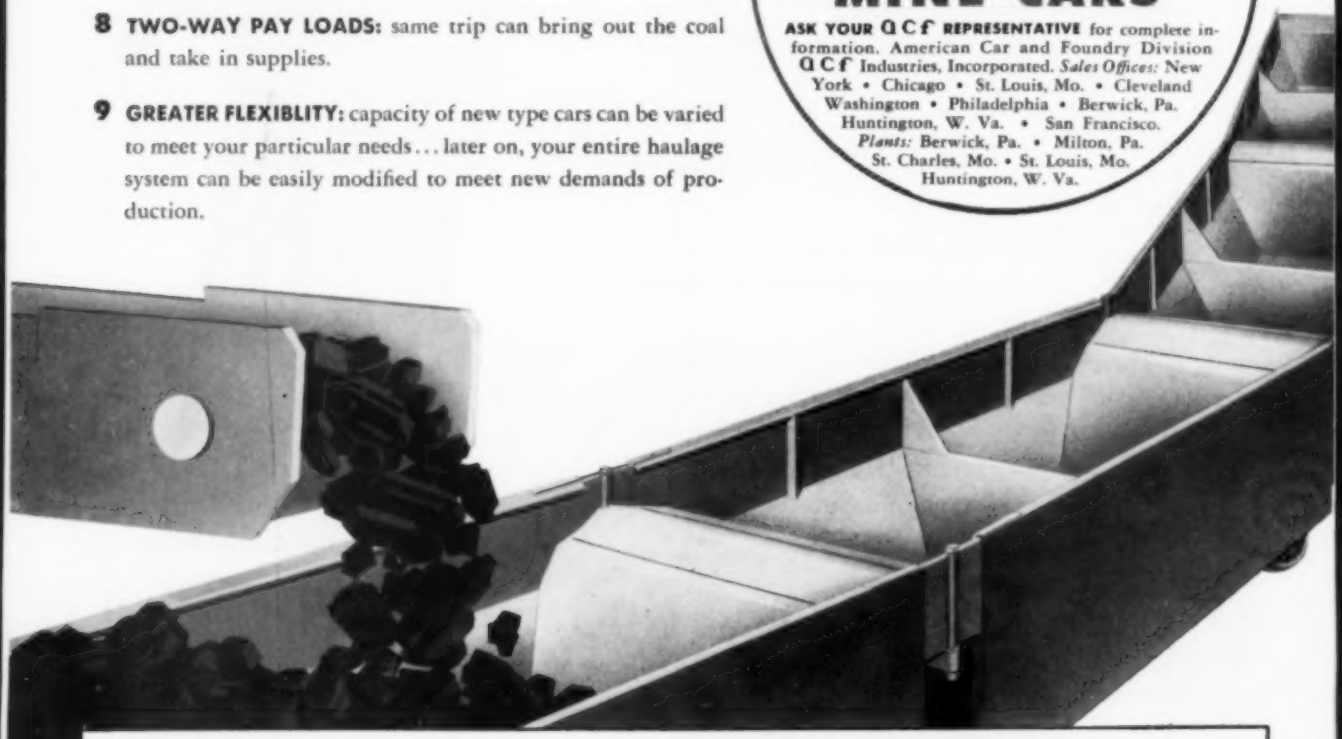
MINE CARS

ASK YOUR acf REPRESENTATIVE for complete information. American Car and Foundry Division acf Industries, Incorporated. *Sales Offices:* New York • Chicago • St. Louis, Mo. • Cleveland Washington • Philadelphia • Berwick, Pa. Huntington, W. Va. • San Francisco. *Plants:* Berwick, Pa. • Milton, Pa. St. Charles, Mo. • St. Louis, Mo. Huntington, W. Va.



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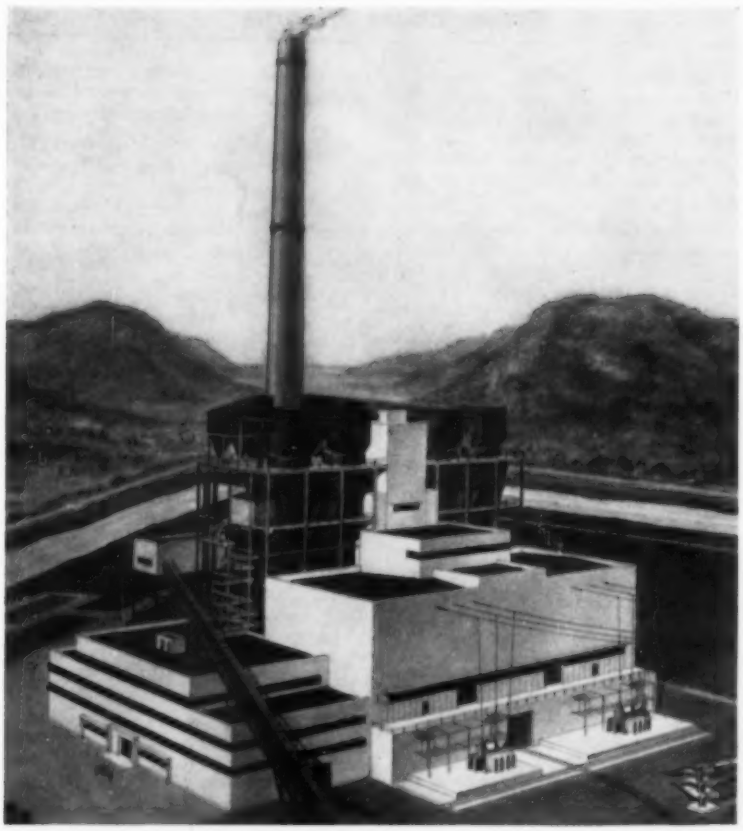

CLINCH RIVER PLANT of the Appalachian Electric Power Co. will look like this when it is completed in 1958. The 450,000 kw station is being built near Carbo, Va., and will burn 1.3 million tons of coal annually.

impressed by the long-term prospects for nuclear energy as a fuel for the production of electric power. The decision to go ahead with super coal-fired units is not due to any pessimism on our part over the ultimate feasibility of atomic power. Rather, it is due to an appreciation of the difficulties that remain to be cleared up before atomic fuel can attain a competitive economic position equivalent to bituminous coal fuel."

He pointed out that the AGE system's location in the heart of the nation's major coal fields has given it a favorable position in exploiting coal as a fuel for power needs over the next several decades.

Automatic Units May Spur Bituminous Market

Wider opportunities for bituminous are expected with the "Coal-O-Matic" automatic bituminous coal burner units which do not require clinker handling, according to Dallas Engineers, Inc., Dallas, Pa., designers and manufacturers of the equipment in cooperation with the Bituminous Coal Research, Inc. laboratories, Columbus, Ohio. The "Coal-O-Matic" will burn various sizes of domestic bituminous coals and all coals have been tested from states such as Kentucky, Ohio, Illinois, Indiana, West Virginia and western Pennsylvania. Automatic forced warm air furnace units have been tested in the laboratory and in the field and a 95,000 Btu bituminous output furnace unit is now being manufactured and distributed to heating dealers. A larger furnace unit (140,000 Btu) is now undergoing final tests. Boiler units for steam and hot water are also in the laboratory being tested for output and performance. The Coal-O-Matic furnace and boiler units are "package" units which combine the burner, furnace (or boiler) and controls ready for installation.

The coal feed system from the bin is a screw type and conveys the coal directly from the bin to the burner. The coal moves across the grates where the coal is burned and the ashes fall off by gravity into the ash receptacle, thereby eliminating any mechanism in connection with ash removal. The burner embodies the cross feed principle with the Coal-O-Matic "Shear Grates" and carburetor, which keeps the fuel bed porous and the coal from fusing, thereby eliminating clinkers.

The carburetor is a simple cored casting which is a combination manifold, preheater, pre-oxidizer and baffle. As a manifold it is the means of distributing the secondary air required. It also preheats the air before discharge, thus preventing the cooling of the volatiles. Large air metering holes are so situated as to promote preoxidation before the plastic stage of coke formation. It is at this stage the coke tree or coke formation would be formed and is eliminated. The small air metering holes give a turbulence and mixture of air with volatiles for smokeless combustion. This air from the carburetor also directs all its air jets downward into the fire, thus baffling a too rapid escape of volatiles, according to Dallas Engineers, Inc.

The burner is attached to the furnace, or boiler, with four nuts and all working parts are completely outside the furnace and boiler to give accessibility for simple repair and maintenance work. A standard 1/6 hp electric motor supplies all power requirements.

Because of the automatic features of the Coal-O-Matic and the low cost of bituminous coal, Dallas engineers believe it should receive ready acceptance by home owners.

Coal Age Awarded Safety Council Citation

Coal Age has been selected again as a recipient of the National Safety Council's Public Interest Award. Ned H. Dearborn, president of the National Safety Council, announced last month that *Coal Age* was among 38 specialized magazines throughout the nation that had been cited for "exceptional service to safety" during 1955.

"Influencing human behavior is the most difficult and the most important part of accident prevention," Mr. Dearborn said. "The only way to reach people is through public information media, and their wholehearted cooperation has played a vital part in the progress of the safety movement. We are proud to honor the outstanding safety leadership represented by these awards."

In a letter to Harold Davis, managing editor, and Ivan A. Given, editor, Mr. Dearborn said: "We here at the Council have been well aware of all you have been doing for safety, and we are delighted that the judges agreed. . . ."

Mr. Dearborn said also that the award was "designed to allow us to express in tangible form our appreciation for exceptional service to safety."

Canada Postpones Debate on Trans-Canada Gas Line

In some of the bitterest sessions of recent parliamentary history, Canada's House of Commons wrangled over the administration's proposal to lend up to $80 million at 5%, repayable next April, to the Trans-Canada Pipe Lines, Ltd., for construction of the Alberta to Winnipeg section of a 2,200-mi natural gas pipeline. Trans-Canada is a privately owned corporation composed primarily of United States interests. A storm of protest was unleashed by the administration Liberal party May 15 when it forced

through a rarely used closure rule limiting debate by each speaker to 20 min. The opposition Progressive Conservative and Socialist CCF parties threw up a barrage of delaying motions. The tactics seemed to have been expected when the next day debate was postponed to give the House time to study the measure. The loan would have to be approved by June 7 to permit a start in construction and to allow the Trans-Canada company to complete the pipeline's prairie section by the end of the year. Start on construction has been long delayed, partly because the Trans-Canada company was waiting for permission from the United States Federal Power Commission to sell some natural gas here. Permission may not be granted at all and it was when this impasse developed that the Canadian government stepped in with its offer of a loan. Opponents of the bill charge that it is a sell-out to a U.S.-controlled pipeline company.

News Briefs

St. Joseph Lead Co. and Pittsburgh Consolidation Coal Co. have squashed plans for an aluminum producing plant at Josephtown, Pa., Andrew Fletcher, president of St. Joseph Lead, disclosed at the company's annual meeting. The decision followed failure to get quick amortization, which would result in the plant being operated at a competitive disadvantage with others, Mr. Fletcher said. Another important reason for killing the plans was an inability to secure adequate low-cost alumina.

Electric utilities are burning 2 to 3 million tons of coal a month more than they burned last year, according to the newest statistical roundup of *Keystone Coal Buyers* Manual, a *Coal Age* affiliate. In January, this year, utilities burned 15,223,796 tons; last year the figure was 12,018,022 tons in the same period; in January, 1954, utilities burned 10,916,819 tons. Similar upward moves occurred in the months of February. Consumption in February this year was 13,181,000 tons; in 1955 it was 11,091,821 tons; in 1954 it was 9,069,419 tons.

The American Waterways Operators, Inc., reports that 202 loading and unloading docks are handling bituminous on mid-continent rivers. The operators also report that barges moved 70,603,702 tons of bituminous and lignite over inland waterways in 1954. An official tabulation for the 1955 movement is not available yet, but the waterways group estimates that the bituminous movement last year was much greater than it was in 1954. The principal rivers serving bituminous traffic in mid-continent and the number of coal docks on each are: Allegheny, loading docks 5, unloading docks 2; Monongahela and tributaries, loading 31, unloading 10; Ohio, loading 23, unloading 63; Kanawha, loading 12, unloading 5; Tennessee, loading 4, unloading 8; Mississippi, loading 3, unloading 13; Illinois and Chicago waterways, loading 4, unloading 13; Warrior-Tombigbee waterway, loading 2, unloading 4.

The Warner Collieries Co., operating division of W. H. Warner & Co., Cleveland, Ohio, will move from its present location in Cleveland's Union Commerce Bldg., to East Bank, Kanawha County, W. Va. The company declares that it is transferring its offices to be nearer the coal properties it operates.

A National Labor Relations Board trial examiner, Arthur Leff, has ruled that the United Mine Workers violated its duty to bargain by striking before it had exhausted the grievance procedures of its contract with the Boone County Coal Corp. mine near Sharples, W. Va. The union struck for a month in January, 1955 over the employment of an operator of a loader. The NLRB examiner rejected union arguments that the UMWA could not be held legally accountable because the stoppage was unplanned and spontaneous. The decision is subject to review by a five-man board.

The 1956 Bluefield Coal Show ended May 25 with a visitor count of 62,000 persons, a figure that exceeds the exhibit's record 1954 attendance of 58,000. Several million dollars worth of equipment, tools and safety devices were put on display and exhibitors said that sales during the show were higher than expected. West Virginia's chief executive, Governor William C. Marland, toured the show May 25. *(The complete list of equipment exhibited at Bluefield will be printed in Coal Age next month as a*

Preparation Facilities

Brule Smokeless Coal Co., Otsego, W. Va.—Contract closed with the Deister Concentrator Co. for six No. 7 SuperDuty Diagonal Deck coal washing tables for cleaning ¼x0 coal and one Model 108 Concenco Revolving feed distributor for six-way feeding.

Old Ben Coal Co., Valier, Ill.—Contract closed with the Deister Concentrator Co. for three No. 7 SuperDuty Diagonal Deck coal washing tables, Model HCRD, for cleaning 5/16x28M coal at Mine 22.

Carbon Fuel Co., Winifrede, W. Va.—Contract closed with the Deister Concentrator Co. for seven SuperDuty Diagonal Deck coal washing tables, Model HCRD, for cleaning ¼x0 coal at the Winifrede mine. Also one Model 108-B Concenco revolving feed distributor, 7/6-way split for feed distribution to tables.

Lake Superior Coal Co., Superior, W. Va.—Contract closed with the Kanawha Mfg. Co. for 300-tph preparation plant to be completed in March, 1957. Mine-run crushed to 7 in, 7x¼ to be washed in a Jeffrey eight-cell Baum jig, ¼x0 unwashed, with provision for future extension of plant to clean ¼x0. The plant includes Reineveld dryers, a water clarification system consisting of two-stage Heyl & Patterson cyclones and an Eimco disk filter, low pressure steam heating and a conveying system for delivering coal to and from ground storage. Facilities also include a "dirty coal" feature to permit track cleanings from inside the mine to be stored and blended at will into the raw coal feed to the plant.

Truax-Traer Coal Co., Eunice, W. Va.—Contract closed with the Kanawha Mfg. Co. for duplicate systems to handle coal from the Powellton seam and from the Hernshaw seam; capacity of each system, 400 tph. Each system consists of a trip feeder to handle 30 loaded cars on a ½% adverse grade, a Kanawha power-operated rotary dump for 26-ft, 4-in car, a motorized rock by-pass, coal and rock feeders, and long belt conveyors for delivering coal and rock respectively to an existing declined rope and button conveyor and to a slate dump. Completion, early 1957.

Valley Camp Coal Co., Shrewsbury, W. Va.—Contract closed with the Kanawha Mfg. Co. for a fine coal drying system, including sump and pump, a de-sliming vibrating screen and a Reineveld 36-in centrifugal dryer. Capacity 60 tph of ¼x0.

Lake Superior Coal Co., Superior, W. Va.—Contract closed with the Kanawha Mfg. Co. for dumping and weighing equipment for shaft mine, including a dump chute with motorized rock by-pass, power operated weigh basket and a heavy duty pipe lever scale with "Printomatic" weigher. Capacity 300 tph; completion, early 1957.

Christopher Coal Co., Morgantown, W. Va.—Contract closed with the Fairmont Machinery Co. for a complete coal preparation plant for the Humphrey Mine. Plant will consist of a trip feeder, rotary dump, scalping screen, R-O-M crusher, raw coal conveyors, a 5,000-ton blending bin, eight raw coal vibrating screens, two 15-ft Chance cones, 48 Deister SuperDuty coal washing tables, 12 Reineveld centrifugal dryers, two Dorr thickeners, two 10½-ft diameter 10-disk Peterson vacuum filters and a river loading terminal. Capacity of plant: 1,320 tph in the Pittsburgh seam (920 tph from Humphrey mine and 400 tph from the Pursglove No. 15 mine). Probable completion date, January, 1957.

Slab Fork Coal Co., Alpoca, W. Va.—Contract closed with The Daniels Co. for a complete preparation plant, including a DMS dense-media system to wash 4x¼ coal from Pocahontas No. 3 seam. Completion date, July, 1956.

Kentucky Ridge Coal Co., Field, Ky.—Contract closed with The Daniels Co. for preparation plant, including a DMS dense-media system to wash 6x⅛ coal from the Crockett seam. Completion date, July, 1956.

Wilmot Builds Complete Preparation Plants or Single Equipment Units

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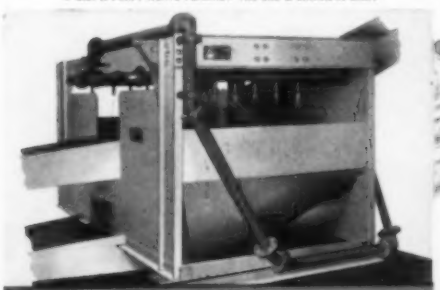


*WILMOT-BCC HEAVY-MEDIA VESSEL -- Offers unprecedented simplicity. 7 models: 25 to 400 tph of feed.

WILMOT CONE CLEANER -- Cleans bituminous down to 10 M; anthracite, Sieve to No. 4.

WILMOT CLASSIFIER -- Cleans bituminous (10M x 0); anthracite (-3/64" x +48 M). Also froth flotation.

Automatic Cleaning Units for Every Use. Pilot Plant Test Facilities Available.

For nearly 50 years, Wilmot has been designing, building and equipping coal preparation plants exclusively. A wealth of engineering and construction experience is available to you, whether your requirements are a single unit of replacement equipment or a complete plant. Wilmot furnishes equipment for four coal cleaning processes: heavy media, cone cleaning, classifier, froth flotation. Embodying Wilmot patented controls, they are fully automatic. At our White Haven, Pa., pilot plant, we maintain laboratory and commercial sizes of Wilmot equipment for customers' testing use.

Pilot Plant, White Haven, Pa., houses commercial size Wilmot cleaning units.

WILMOT ENGINEERING CO. HAZLETON, PA. Plant: WHITE HAVEN, PA.

THE HAZARDS OF STATIC ELECTRICITY are demonstrated at a meeting of the Appalachian Chapter of the West Virginia Society of Professional Engineers, Beckley, W. Va. The men above are Thomas Howard, (left), secretary of the chapter and mining engineer for the New River Co; James A. Barritell, vice president of the chapter and superintendent of McAlpin Mines, Winding Gulf Coals Inc; P. C. Van Natter, U. S. Bureau of Mines (demonstrator); and Lloyd G. Fitzgerald, president of the chapter and mining engineer, explosives, USBM.

SCULPTOR TO PRESIDENTS is the unofficial title earned by Anthony Magdalinski, Plains, Pa., who has been fashioning ornaments of anthracite for three decades. Above, he applies finish to an anthracite desk set that was presented to President Eisenhower. Another chief executive, President Franklin D. Roosevelt, used an anthracite desk set made by Mr. Magdalinski. A former miner, the Pennsylvania man has created anthracite ornaments for John L. Lewis, Babe Ruth, Pennsylvania's Governor Leader, entertainer Eddie Cantor and sports announcer Mel Allen.

special staff written report. New equipment will be given special emphasis in the Equipment News section.)

The Truax-Traer Coal Co., Chicago, Ill., has acquired all the outstanding capital stock of the Little Sister Coal Corp. in exchange for 174,000 shares of Truax-Traer common stock. In the transaction, Truax-Traer acquired 6,000 acres of land near Canton, Ill., and adjacent to Truax-Traer's Fiatt Mine. The Little Sister properties also include strip mining equipment and a preparation plant. The Fiatt Mine has a capacity of 800,000 tons annually. The assets of Little Sister are valued at more than $5,000,000.

A two-week strike at Glen Alden Corp., Wilkes-Barre, Pa., ended May 24 with the return to work of 4,800 men. Settlement came after Glen Alden paid royalties to the United Mine Workers' health and welfare fund, royalties which it owed for the first quarter of this year. The strike began May 9 after Glen Alden had withheld the welfare payments, F. O. Case, president of Glen Alden, said that the ayments had been withheld because the refusal of several anthracite companies to meet the same obligation had placed Glen Alden at a competitive disadvantage.

Bituminous Output

YEAR TO DATE	PRODUCTION
May 12, 1956	189,377,000
May 14, 1955	161,377,000

1956 output 17.4% ahead of 1955. A month earlier output was 17.2% above 1955.

WEEK ENDING	PRODUCTION
May 12, 1956	10,060,000
May 14, 1955	8,737,000

Anthracite Output

YEAR TO DATE	PRODUCTION
May 12, 1956	10,119,000
May 14, 1955	9,642,000

1956 output 4.9% ahead of 1955. A month earlier 1956 output was 1.3% over 1955.

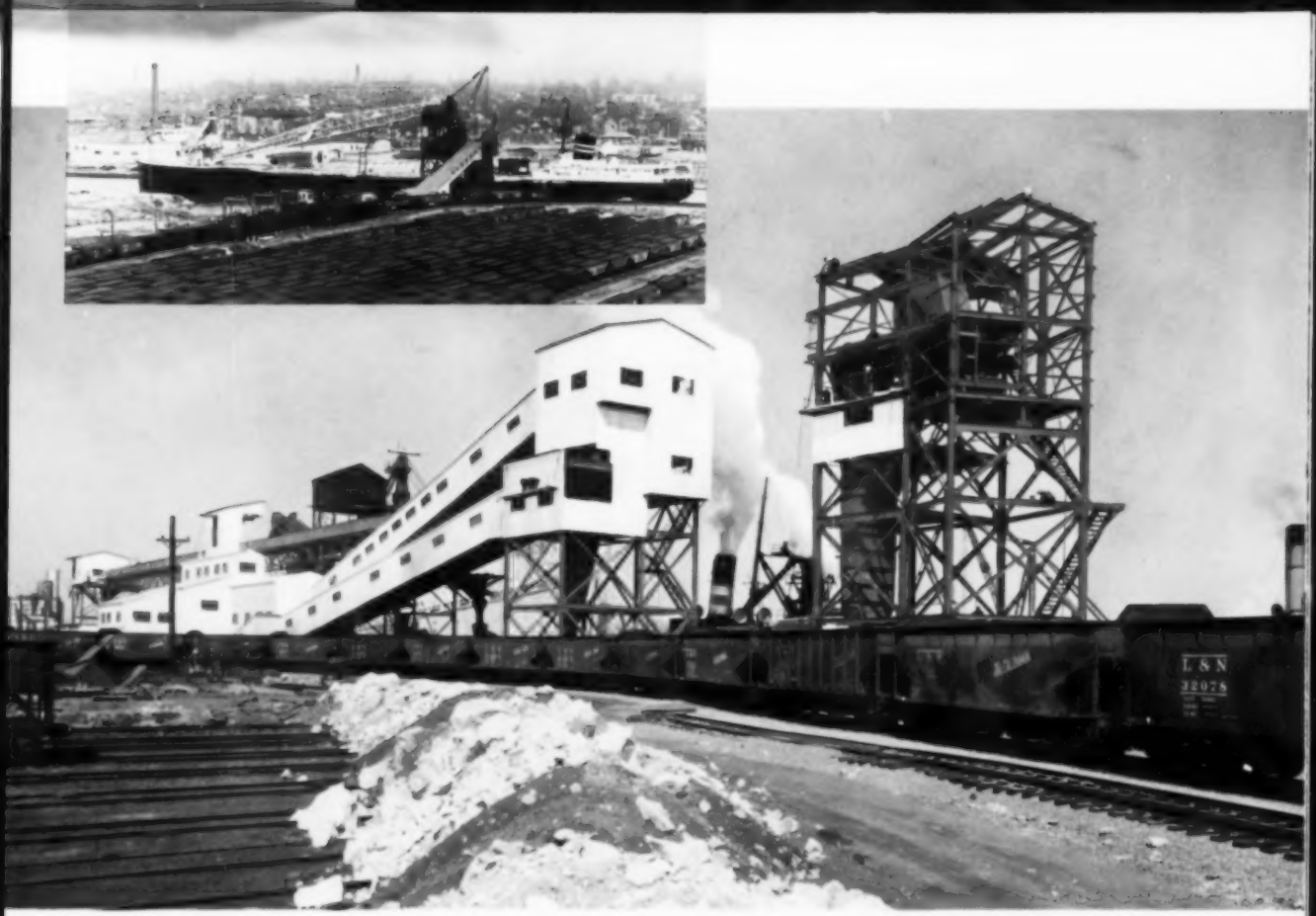
WEEK ENDING	PRODUCTION
May 12, 1956	402,000
May 14, 1955	418,000

Oil imports, both crude and residual, were within reasonable limits in the past few months, says Office of Defense Mobilization chief Arthur S. Flemming. But the ODM director is concerned over the volume of oil that importers have scheduled for the present quarter of 1956. At the same time, however, he hints that the government may liberalize an import formula it set up last year. Meanwhile, importers are still on their own—the restraint is up to them.

Four men were killed May 1 in an explosion at a Hanna Coal Co. strip mine near Cadiz, Ohio. The cause of the explosion was not determined, but a crew had been about to blast the top of a highwall.

Twelve sample homes, the beginnings of a 205-home housing development near Mountaintop, Pa., will be equipped with anthracite-burning, stoker type heating units. The builders, Asheroff & Berger, New York, say that the entire 205 homes in the $4 million development will be equipped to burn coal unless buyers insist on oil-burning facilities.

The largest coal unloading tower (capacity 700 tph) on the Florida coast is



New expanded facilities of RAIL TO WATER, INCORPORATED, CHICAGO, have increased loading capacity from 3000 tons per hour (inset above) to 8000 tons per hour.

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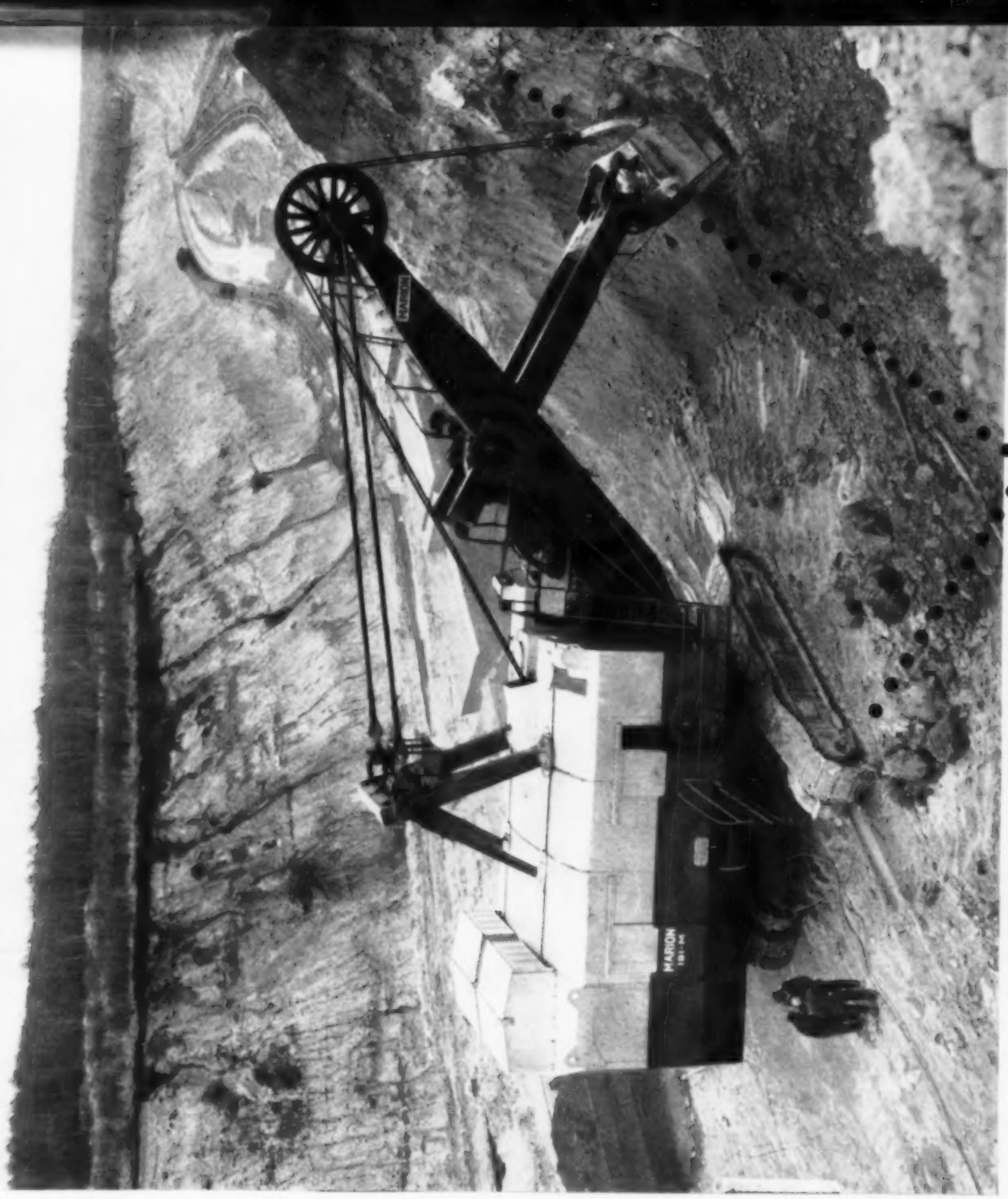


BIGGEST DIGGER ON TWO CRAWLERS

The 10 yard dipper of this big digger is impressive, for the MARION 191-M is the world's largest loading shovel on two crawlers. Equally important on the iron range is the fast, small-machine cycle time that converts mountains into rail car loads in jig time.

MARION POWER SHOVEL COMPANY • MARION, OHIO

COAL MEN ON THE JOB . . .

BLACKFOOT COAL & LAND CORP., Kerwin, Ind.—Earl Auten (left), clerk; Earl Davis, preparation foreman; Paul Eskew, weighmaster, and U. S. Cravens, night watchman.

EASTERN GAS AND FUEL ASSOCIATES—W. J. B. Mayo, (left), manager, northern division and E. H. Shaw, superintendent, Federal No. 1 mine, Grant Town, W. Va.

AMHERST COAL CO.—Dana slope, Rensford, W. Va. W. W. Dingess, assistant to the president.

nearing completion. Equipped with a 6½-ton bucket, the tower will serve Tampa Electric Co., Tampa, Fla., and is being constructed by the Mead-Morrison Div., McKiernan-Terry Corp., Harrison, N. J., for the Nashville Coal Co., Madisonville, Ky. The tower's equipment includes a rope reeving system that utilizes a single continuous rope for hoisting and for closing motions.

Dr. Stanley H. Langer, Synthetic Fuel Research Branch, USBM, Pittsburgh, Pa., was selected by the American Chemical Society's Div. of Gas & Fuel Chemistry to receive the first Bituminous Coal Research Award for his paper, "The Chemistry and Structure of Coal, I. Optical Activity in Oils Derived from Coal." The award was presented May 17.

Dr. Ford K. Edwards, director of the National Coal Association's Dept. of Coal Economics, resigned May 1. As a transportation consultant, he plans to establish an office in Washington, D. C.

Pennsylvania Coal & Coke Co. has reopened its Ehrenfeld No. 8 mine near South Fork, Pa., after a 2-yr shutdown.

"The Coal Miner," a painting by Vachel Davis, is being printed on chinaware for national distribution. Mr. Davis, a miner turned painter, created "The Coal Miner" when he was guest-artist and protege of John Stuart Curry at the University of Wisconsin. The original hangs in the Illinois state capitol building in Springfield. Mr. Davis has been connected with coal for more than 35 yr. In 1948, he received the "Hero Award" of the Joseph A. Holmes Safety Association. For 25 yr he has been staff-cartoonist of the UMWA Journal and is the creator of the safety cartoon feature, "Miner Jim Sez." Mr. Davis lives and works at his Minartis Studio, Eldorado, Ill. "The Coal Miner" is being reproduced photographically on a 10-in diameter plate.

EQUIPMENT APPROVALS

Three approvals of permissible equipment were issued by the U. S. Bureau of Mines in April:

Ensign Electric & Mfg. Co.—Bulletin 2025 coal planer; two motors each 50 hp, 250 v, AC. Approval 2-945, April 13.

Manson Machine Co.—Wet rock dust distributor; one motor, 10 hp, 230 v, DC. Approval 2-1139, April 16.

Joy Mfg. Co.—Type X-847-4 Model "C" 36-in belt conveyor crawler-mounted drive unit; two motors, one 10 hp and one 15 hp, 500 v, DC. Approval 2-1140A, April 18.

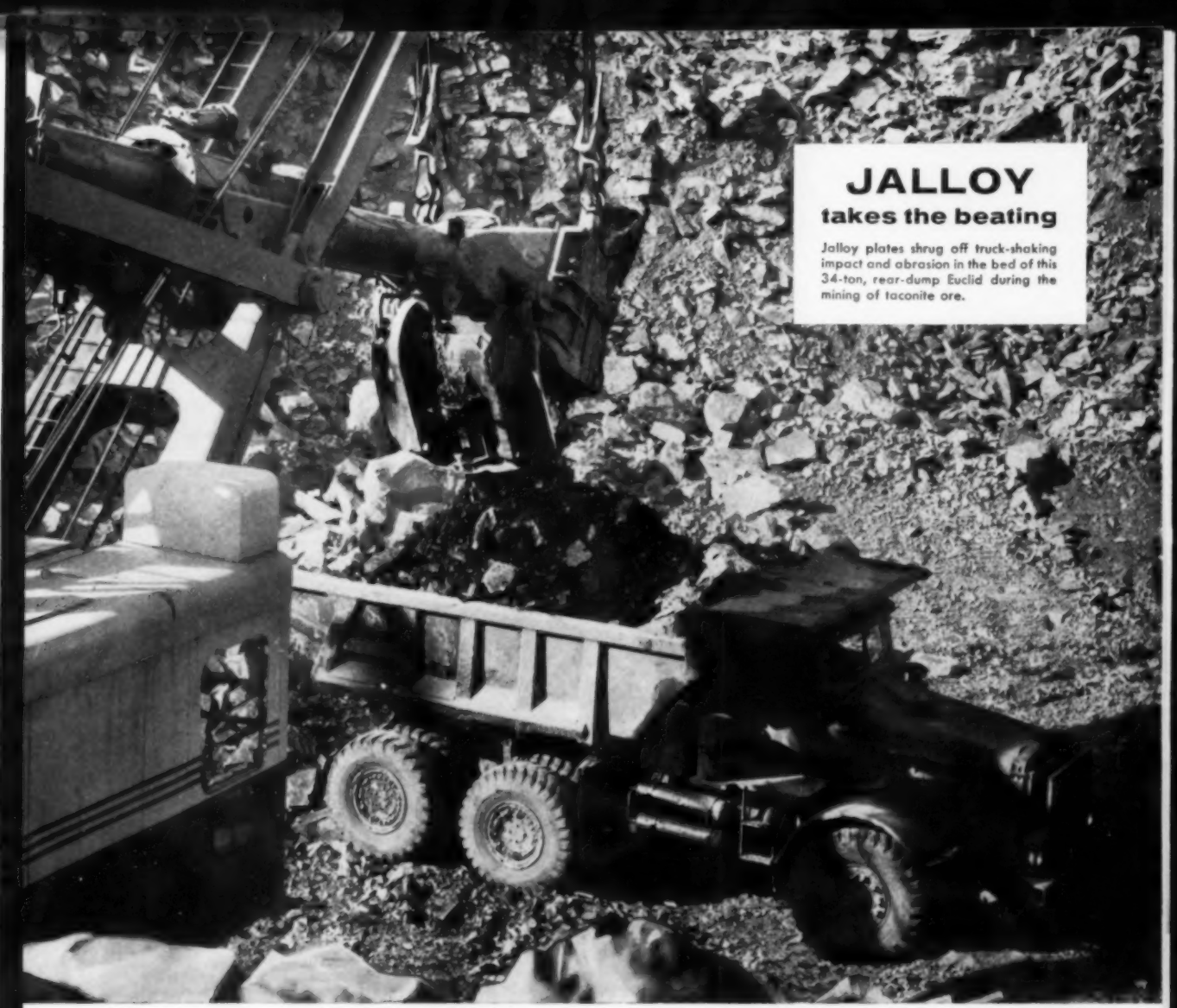
In addition, the USBM assigned acceptance designation 28-10 to Raybestos-Manhattan, Inc., April 2, to cover certain belts.

1956 Earnings

Ayrshire Collieries Corp.—Net income of $803,536, or $1.35 a share on common stock, for the first quarter, compared with a net income of $710,059, or $1.25 a share in the same period last year.

Glen Alden Corp.—Net income of $18,885, or one cent a share for the first quarter, compared with $1,005,000, or $.59 a share in the same period last year.

West Kentucky Coal Co.—Net income of $487,274, or $.57 a share in the first quarter, compared with $159,383, or



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Jalloy plates shrug off truck-shaking impact and abrasion in the bed of this 34-ton, rear-dump Euclid during the mining of taconite ore.

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Jalloy—special purpose steels that are heat treated to provide longer wear on applications where impact and abrasive conditions are severe—last 4 to 20 times longer than conventional mild steels. Furthermore, they are easily welded.

Jalloy is available in three grades:

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No. 3—a general purpose steel capable of being heat-treated to excellent physical properties. Compared to ordinary mild steels it offers good resistance to abrasion or wear in the as-rolled state; but when heat treated to Brinell 340 and above, optimum abrasion and impact resistance is secured.

No. 7—possesses high hardness together with good ductility or wear resistance. Excellent for spring applications as well as flat work.

Jalloy high strength steels are available as plates, structurals, bar and small shape sections, hot rolled sheets, as well as strip and wire products.

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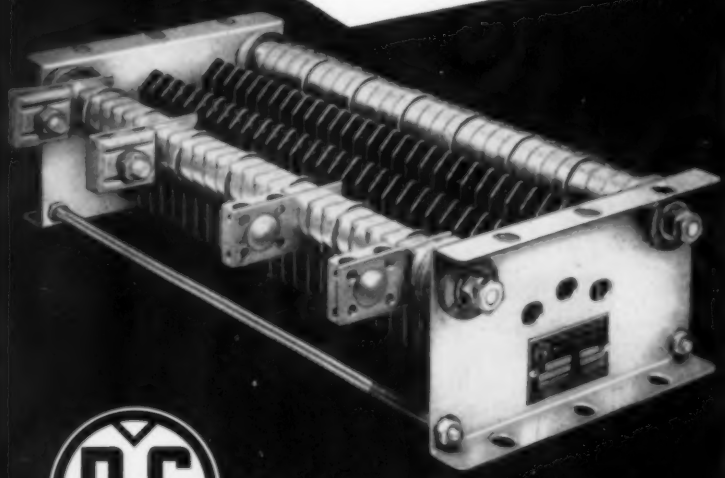

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Different, because steel and mica, both extremely durable materials, coupled with P-G exclusive design produce a resistor of great mechanical strength. There is nothing to break. With accurate resistance values and adequate carrying capacities, P-G Resistors outlast ordinary resistors. Tell us your specifications and let P-G solve your resistor problem.

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Earnings (*Continued*)

$.19 a share in the same period last year.

Peabody Coal Co.—Net income of $2,007,625, or $.25 a share in the first quarter, compared with $1,682,952, or $.20 a share in the same period last year.

Island Creek Coal Co.—Net income of $2,137,812, or earnings of $.98 a share on common stock in the first quarter, compared with a net income of $1,243,208, or earnings of $.64 a share on common stock in the same period last year.

Books for Coal Men

Illinois Coal

Subsurface Geology and Coal Resources of the Pennsylvania System in Crawford and Lawrence Counties, Illinois, by Paul Edwin Potter describes the distribution and structure of coal beds in the southeastern border of Illinois. Economically important coals are described briefly. *17 pp. with maps. 6¾x10-in; paper. Report of Investigation 193, State Geological Survey, Urbana, Ill.*

Methane Drainage

Drainage and Use of Methane From Coal Fields covers in detail the European methods for draining methane from mine workings and how the gas is used for domestic and industrial purposes. *177 pp. 6x9½-in.; paper. $1.50, Organization for European Economic Co-operation, Publications Office, 2000 P St., NW, Washington 6, D. C.*

Roof Bolting

The following reports, all prepared by Louis A. Panek, physicist, USBM, are available free from the *Bureau of Mines, Publications Distribution Section, 4800 Forbes St., Pittsburgh 13, Pa.*

Theory of Model Testing as Applied to Roof Bolting, R. I. 5154

Design of Bolting Systems to Reinforce Bedded Mine Roof, R. I. 5155

Principles of Reinforcing Bedded Mine Roof with Bolts, R. I. 5156

Safety

Safety Management, by Rollin H. Simonds and John V. Grimaldi. This work provides a survey of safety management in which suggestions and procedures are offered, including a section on accident cost analysis and ideas on the psychological aspect of accident prevention. *568 pp. $7.80, Richard D. Irwin, Inc., Homewood, Ill.*

Approved Drill Dust Collectors

Drill Dust Collectors Approved by the Bureau of Mines as of January 31, 1956 lists companies manufacturing approved units for collecting harmful dusts created during rock drilling in coal mines, and describes tests carried out over a period of many months. *I. C. 7741, Bureau of Mines, Publications Distribution Section, 4800 Forbes St., Pittsburgh 13, Pa.*

Solve your coal cleaning problems at minimum cost per ton

A Chance Sand Flotation Process unit is the dependable, economical and lasting solution to your coal cleaning problems. Regardless of the size of your operation, there is a Chance Cone made to give you maximum efficiency at minimum cost.

Best recommendation for the Chance Process is our record of repeat orders. Here are some of the reasons the big and expanding producers of the industry find it to their advantage to reorder our equipment:

High Separating Efficiency

. . . Close to 100% recovery of salable coal

. . . Washing gravity not affected by fluctuating rates of feed

Wide Flexibility

. . . Coal handled at gravities from 1.35 to 1.65 with sizes from ⅛ in. to 10 in.

. . . Washing gravity can be changed in 5 minutes

Economy of Operation

. . . Heavy, well-built equipment assures troublefree performance

. . . Equipment requires only part-time attention of one man

UNITED ENGINEERS

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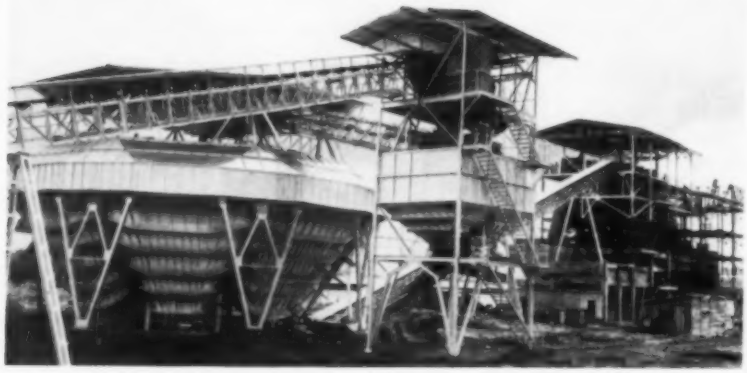
Foreign News



COLOMBIAN COAL WASHING PLANT near San Francisco, Colombia, a small village close by the Andes and close by an estimated 20-billion ton deposit of coking coals. Note the radial design of the hoppers (**Coal Age**, March, 1956, p 122) which are fed from a central feeder. The design is credited to Preparation Industrielle des Combustibles (PIC Fountainebleu), a French manufacturer. The rest of the plant is American-designed.

COLOMBIA

A 20 billion ton coking coal deposit, believed to be the largest in Latin America, is being opened 30 miles south of Cali, a booming Colombian industrial town. Columbia expects to supply South American markets and others, some of whom (e.g. Japan, 3.5 million tons) are customers of the United States. A local company, Industria Hullera, situated in the tiny village of San Francisco, expects to be shipping 1,000 tons daily by the end of 1956. Only one problem besets the company—a shortage of skilled technicians. As a result it is willing to offer the management end to a "good U.S. company." Ample financing from the Colombian government is backing Industria Hullera. Meanwhile a 250-tph washing plant (photo) has been constructed near Cali with a radially-designed system of hoppers. Coal is fed from a single conveyor belt through a central distribution point, thus eliminating special distributing conveyors.

RUSSIA

***Pravda* announced last month that experiments to remove coal hydraulically were underway in a mine situated in the Karaganda coal basin.** The newspaper's article said that during the next 5 yr five mines will be using hydraulic removal and hydraulic surfacing. The hyrdaulic method, according to *Pravda*, is based on making a coal pulp (slurry) at the mine, cutting and pumping it through a series of pipe-lines along mine shafts and to the surface.

The Soviet Union plans to increase open-pit mining during the next 5 yr to reach a total of 122 million metric tons of pit-mined coal during 1960. The Deputy Coal Minister of the USSR, B. F. Bratshenko, said in May that production in strip mines is about six times as high as underground production. (In 1955 United States mines stripped some 115 million tons, including both anthracite and bituminous.)

Meanwhile, Mr. Bratshenko announces that very large dredgers are being supplied to the Soviet coal industry by the Novokramatorsk Machine Works. The newest type has a bucket content of 529 cu ft, while a self-propelled dredger has one of 212 cu ft. The Ministry plans to produce dredgers with a reach of 328 ft and a bucket content of 883 cu ft. One of the already commissioned dredges reportedly handles coal from a depth of 164 ft and transports it 656 ft, with a working cycle of 70 to 75 sec.

EASTERN EUROPE

The problems of the East European coal business are numerous and hinge on a number of things. Some of them are a scarcity of manpower, a scarcity of trained technicians and a scarcity of usable equipment. Shortcomings in utilization of material because of faulty organization, overdrawing primary energy consumption and funds have boosted prices. Utilization of manpower and a high rate of absenteeism, together with alcoholism, have created a difficult situation for mine managers, who in most cases are Communist party functionaries rather than coal mining experts. The basis of all difficulties could, perhaps, be traced to this lack of know-how in most of the management personnel group.

LUXEMBOURG

Since May 1, rail-borne coal has moved across the frontiers of the European Coal & Steel Community countries (France, West Germany, Italy, Belgium, the Netherlands and Luxembourg) without incurring extra transport charges because they have crossed a border. International through-rates, which taper in proportion to the distance covered, were introduced May 1, 1955. On the same date Community countries abolished two-thirds of the terminal charges levied on either side of the frontiers. Now, the remaining one-third has been abolished and the crossings within Community countries no longer affect transportation costs. Savings such as this are the result: a ton of coal that had cost $7.10 to ship from the Ruhr to Luxembourg now costs $5.80 to ship.

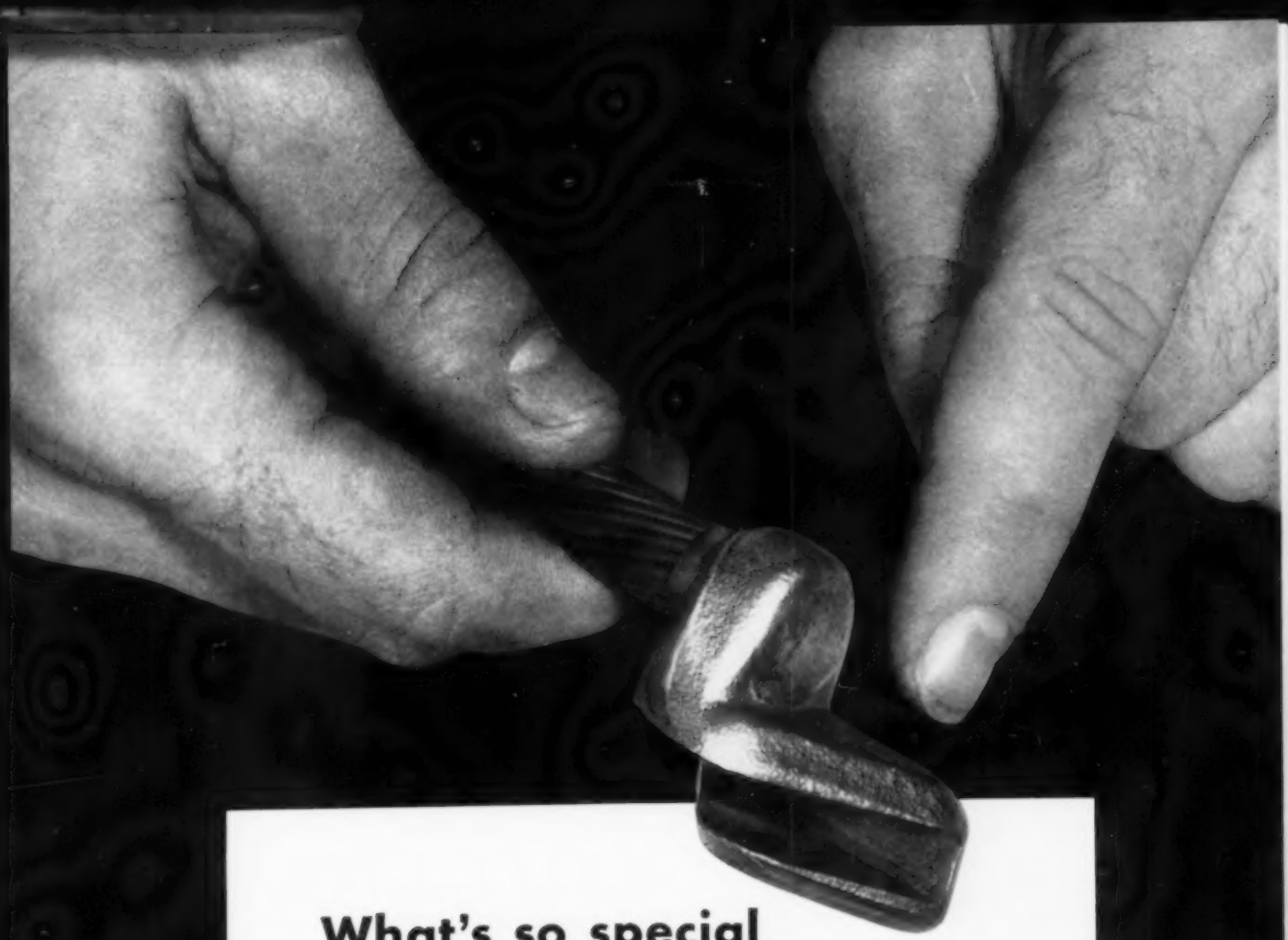
GREAT BRITAIN

British Coal Utilization Research Association scientists are engaged in developing a central heating system that involves no expensive house renovating. The system is said to be so simple to install that it can be fitted into any room of a house by the householder, himself. The only structural work involved is drilling holes through walls to permit ½-in copper pipes or ¾-in iron pipes to carry hot water to each room. An ordinary commercial masonry drill will do the job. A small boiler, or fire, is maintained thermostatically at a constant temperature and is sufficient to heat the water which is forced through the pipes by a small electric motor that consumes 60 to 70 w. The pump used is so silent that it cannot be heard in the rooms of the house even on the quietest night.

Woodall-Duckham Construction Co., Ltd., London, has been awarded a contract worth $5.6 million by the Durham Divisional Coal Board to construct a new coke oven and by-product plant in Murton, England. The company will build 50 ovens to handle 1,000 tpd.

Britain's National Coal Board has announced its intention to spend $2,800 million on reorganization and development of the coal industry over the next 10 yr. It has thrown out a 1950 financing program as unrealistic and has admitted that nearly twice as much money will be needed to reach a 1956 output of 240 million tons. In 1950 the program envisaged an expenditure of $1,778 million. The original plan's estimate was that 618,000 miners would be required in 1965, a reduction of some 80,000 employed in 1950. The board now estimates that the industry will need 682,000 in 1960 with an output per man-year of 319 tons, and 672,000 in 1965 with an output per man-year of 342 tons. But, even the new estimates rest on assumptions that could upset them. One is that the NCB will be able to get the "requisite manpower in the right places." The other is that there will be no decrease in total working time. In short, this means that any reduction in hours of work in the mines must be offset by improved attendance or productivity.

British business men and members of Parliament have been reported ready to sumit a plan to Prime Minister Eden "for strenuous development of Rhodesian coal mining." Rhodesia's Deputy Prime Min-



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What's so special about the terminal of this AW-22 rail bond?

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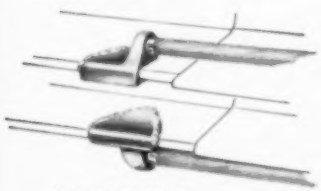

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Says R. H. Edwards, Chief Electrician, Pocahontas Fuel Company Mine, Itmann, W. Va.

Aeroquip Hose Lines on this hydraulic test stand can be removed and reassembled with ease.

Hydraulic hose line replacements at Pocahontas' Itmann Mine are made quickly from a small supply of Aeroquip Bulk Hose and Reusable Fittings. Using Aeroquip, hose lines can be assembled as needed, in the maintenance shop or down in the mine.

"This cuts downtime and keeps equipment on the job," reports Mr. Edwards. "An Aeroquip installation is a lasting installation, too".

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ister, Sir Ray Welensky, says that if Rhodesia's vast coal reserves could be developed the country could supply the world's coal needs for 1,000 yr. The purpose behind the British plan is seen by observers as a move to curb mounting British fuel imports.

An increase of about 8% in the pithead price of coal in Britain is expected to be made by the National Coal Board. The increase, in fact, was expected by June 1. The average cash rise, observers say, will probably amount to about 85 to 70 cents a ton. This will result in an annual increase in revenue to the NCB of about $154 million. Clearly, its aim is to wipe out accumulated deficits which stood at $102,480,000 at the end of 1955. If prices remain fairly stable, the move will likely succeed. The pithead price of coal was increased by 18% in July, 1955. This resulted in average rises of $1.77 a ton on house coal and $1.54 a ton on industrial coal. There have since been two other increases in retail prices because of rises in freight rates and distribution costs. In London these totaled 64 cents on one house coal, bringing its basic price to $21.14 a ton.

The British Ministry of Fuel & Power and the Central Electricity Authority may soon reach decisions which are expected to substantially accelerate the British Government's nuclear energy program. Instead of two nuclear power stations to be built in 1957, it seems probable that three, or even four, will be started within the next few months. It is expected that at least one of the stations will generate 200,000 kw.

Britain's National Coal Board sent a team of experts to visit Russia's coal mines last month as part of an exchange of visits suggested by A. Zademidko, Soviet minister for the USSR coal industry. The British team was led by Dr. W. Reid, NCB, and is scheduled to return to England this month.

More than 100 young coal haulers struck at Denaby Colliery, Mexborough, England, because a shift that ended at 9:30 pm left very little time for after-work courting. The young haulers said they were losing their girls whose jobs ended at an earlier hour. Pit manager Nathaniel Irving conceded that spring was here, but said that an earlier quitting time would disrupt the colliery. As a result the young miners walked out with the applause of at least one young lady who said: "I'm fed up with staying home nights. The men are justified."

PAKISTAN

An agreement has been signed in Karachi for Pakistan to buy 300,000 tons of coal from Communist China. The contract is the second since March when Pakistan bought 125,000 tons from the Communists.

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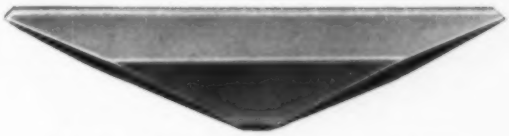

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PAUL H. ROBBINS (left) and Jesse E. Hobson addressed luncheon sessions at the two-day BCR Techno-Sales Conference. Mr. Robbins, executive director, National Society of Professional Engineers, spoke April 18 on "Professional Responsibilities of the Engineer." Mr. Hobson, former director, Stanford Research Institute, talked April 19 on "Research—Insurance for an Industry's Future."

BCR Looks Ahead

BCR's Third Techno-Sales Conference stresses future engineering, sales and research needs of a growing industry. Columbus, Ohio sessions, April 18-19, suggest programs for closer liaison between the fuel engineer and the sales staff and for better recruiting of technical personnel. BCR reports progress and plans on improved utilization equipment, mining methods, and the coal-fired gas turbine. Opportunities for coal in aluminum and steel are discussed.

The Fuel Engineer

Partner in Selling

THE JOB OF SELLING COAL today is a team activity in which more and more independent responsibility should be given to men with technical backgrounds. Coal sales and market development problems are so heavily weighted with technical obstacles that fuel engineers must more and more be selected who have a flair for market promotion and development. The era of the service engineer, whose tools were the coal shovel and slice bar, is over.

Today, with utilization problems so numerous in all use classifications, the application of the highest technical skill is necessary if producers are to obtain broad consumer acceptance and adequate realization for their products. Competitive conditions have greatly reduced the inertia that has limited the use of engineers on direct sales and market development.

Every coal user or prospect, either consciously or unconsciously, superficially or scientifically, goes through an evaluation process in determining which fuel to use, whether he should change coals or possibly change fuels. The factors considered (52 in all) may be grouped under four general classifications: public relations, fuel acceptance, equipment acceptance and economic acceptance. At least 50 of the 52 factors require engineering consideration under scientific study and evaluation.

When an engineer is employed who shows personality, initiative, imagination and sales competence, the mistake is often made that he is transferred to direct sales with responsibility for a particular group of customers. The reverse of this should also be avoided—don't take a good salesman and try to make him a combustion expert. It is much better to use the inherent qualifications of both men in the development of a team activity that will maintain satisfactory consumer relations.

Independent sales and engineering activity requires that each man keep his teammate intimately informed of progress of impending action. Independent technical development work requires that the engineer keep his sales manager well informed.

Engineering reports that show good work in the solution of consumer problems or outstanding development work, should be widely distributed within each company to both salesmen and engineers. It is also my opinion that all of the engineers in each company should get together for a discussion of common problems at least once a year.

E. C. Payne, consulting engineer, Pittsburgh Consolidation Coal Co.

INDUSTRY MEETING—
A Special COAL AGE
Staff-Written Report

As Seen by the Association

FUEL ENGINEERING SERVICE by associations could better be named and pursued as fuel engineering service by and for the coal industry. For best results, it must be industry wide in scope.

The sales engineering endeavor of the NCA Market Promotion Committee is being advanced under three broad market classifications: (1) new construction, (2) prevention of conversion of coal to competing fuels and (3) the conversion from gas or oil to coal. All three are important but the new construction probably offers the greatest field for successful effort.

Important in the new construction field are architects and engineers. Once convinced that the owners of the project can save money over a period of years by using coal, the professional man is really glad, or at least willing, to design for coal. For successful effort, up-to-date coal efficiencies and modern burning equipment must be merchandised.

The problem of coal plants converting to other fuels is a most serious one. In practically all of the "coal burning" territory of the United States, substantial savings can be made by use of coal rather than gas or oil, particularly if a janitor is regularly employed or where a fireman is required by law or size of equipment. If a fuel study is made, the fact can be established beyond argument. However, these plants are being lost because management, after using coal for 20 yr to 50 yr, apparently does not even consider modernizing the coal-burning plant.

The management of plants which have been using other fuels for some years are usually more receptive to the idea of considering modern coal than the people who have not used other fuels. The glamour has worn off. They know that oil varies in quality, that the burners and pumps need frequent maintenance, that the automatic controls do not work. The vaunted 80% or higher efficiency just doesn't prove out in day to day fuel operation. High fuel bills are concrete facts and make the lower cost of coal attractive. Once they are convinced that coal doesn't need to be shoveled, and that a coal-fired boiler room can be clean, the battle is won.

Many company engineers are now doing valuable work in preserving the markets for coal against gas and oil—both in new construction and old. This

effort can be expanded and broadened without seriously interfering with the effort for the private company. First steps have been taken in acquainting fuel engineers with the NCA Market Promotion Program and the response to this has been gratifying. The interest of the coal industry can best be served by expanding this cooperation in presenting a united front.

Carroll F. Hardy, director, Market Promotion Dept., National Coal Association.

Links Sales and Mining

A FUEL ENGINEER, sales engineer, service engineer or field engineer, as he is variously named, should act as liaison between the sales department and the mining department.

A fuel engineer to be fully effective must know, not only how to properly apply the coal produced by his company, but must also have a real sound appreciation of the possibilities and limitations of the methods of preparation that prevail at the mines.

If he should overlook any possibilities of refinement in the preparation at the tipples, he may miss opportunities to suggest changes in preparation which would make for greater customer satisfaction.

If, on the other hand, he should overlook basic limitations of preparation that exist at the mines he may attempt to satisfy customers or prospective customers with promises of changes in preparation that are not feasible or possible and by doing this he may close the door to prospects of future sales.

At times the sales department may believe that the mines should produce what the sales force can sell the easiest whereas the mines may feel that the sales department should sell what the mines can produce the easiest. Quite often neither position is correct and some compromise between these two positions is the proper one. That is when the fuel engineer can be most helpful provided he completely understands the preparation possibilities and limitations at the mines as well as he knows the customer needs.

The fuel engineer can at times suggest some possible and reasonable change in preparation which will make the coal shipped a more acceptable product. Then again he may be able to explain to the sales department why some of their ideas relative to preparation may not be fully practical but how some moderate change in preparation along with a different sales approach may accomplish the desired results. By taking a middle ground position the fuel engineer may not be loved by either sales or operations—but that's part of the job and in time this stigma will fade if the suggestions offered by him prove sound and effective.

R. S. Lane, mechanical engineer, Pocahontas Fuel Co., Inc.

Coordinated with Sales

WE FEEL that there are five common prerequisites for maximum efficiency under any system or method designed to coordinate fuel engineers and sales.

First, there must be a clear and definite understanding on the part of sales representatives and fuel engineers of their own and each other's duties, functions and responsibilities. It is equally important that supervisors be fully informed on this score. The one best way of accomplishing this objective is through detailed written job descriptions. The use of this management tool is standard procedure in most of the leading corporations in other industries and we believe is highly desirable in our industry.

The second factor is the training of employees. Training will bring a knowledge and appreciation of technical know-how of salesmen and on the other hand it will bring to fuel engineers an appreciation and knowledge of the importance of the human equation.

The third factor is attitude—the attitude of the engineer toward the salesman and the attitude of the salesman toward the fuel engineer. Some 20 yr ago, there was generally a high degree of antagonism and misunderstanding between salesmen and engineers. Mutual respect and understanding for each other's specialized talents obviously must be, and is, the forerunner of effective coordination of fuel engineering with coal sales.

The fourth factor is cooperation. There are two main areas in which cooperation is essential. One of these is planning and the other is communications.

The final factor is supervision. Supervision is the control panel for the entire operation of the sales team. Supervision methods obviously must be adapted to a particular company and they must be varied from time to time to maintain their effectiveness. If I had to recommend any one phase of supervision as most important, it would be the "open-door policy." Encourage both the salesman and the engineers to come to you for help with their problems.

W. W. Bayfield, executive vice president, American Coal Sales Association.

Elections

J. E. Tobey was elected first vice president, Bituminous Coal Research, Inc., and the remaining officers were re-elected. They are **Dr. A. A. Potter,** president; **Dr. H. J. Rose,** vice president and director of research; **C. A. Reed,** secretary and treasurer; and **J. F. Hanley,** assistant secretary and assistant treasurer.

New members of the board of directors include **R. H. Hughes,** president, Clinchfield Coal Corp.; **E. P. Humphrey,** president, Stonega Coke & Coal Co.; **C. R. Mabley, Jr.,** vice president, sales, Island Creek Coal Sales Co.; and **C. F. Spencer,** sales engineer, Pittsburgh & Midway Coal Mining Co.

The four members reelected to the board are **J. N. Geyer,** vice president, Imperial Coal Corp.; **S. B. Johnson, Jr.,** president, The Lorado Coal Mining Co.; **A. R. Matthews,** president, Pocahontas Fuel Co.; and **J. W. Morgan,** president, Ayrshire Collieries Corp.

The remaining members of the 15-man board are **L. C. Campbell,** vice president, Eastern Gas & Fuel Associates; **Dr. A. A. Potter,** president, BCR; **Jos. Pursglove, Jr.,** vice president, research and development, Pittsburgh Consolidation Coal Co.; **L. N. Thomas,** president, The Carbon Fuel Co.; **J. E. Tobey,** president, Appalachian Coals, Inc.; **W. J. Tuohy,** president, Chesapeake & Ohio Railway Co.; and **H. C. Woods,** chairman of the board, Sahara Coal Co.

Elected to the Executive Committee were **Dr. A. A. Potter,** BCR's president, **L. N. Thomas, J. E. Tobey, J. W. Morgan,** and **S. B. Johnson, Jr.**

New Responsibilities

THE ENGINEER has come into an unrivaled position of eminence in today's economy. With that position goes great responsibility and challenge.

During the last 10 yr, the engineer has contributed greatly to progress. Nearly every industry has its examples to cite of new products, technological advances, mechanization and automation. As impressive as these advances have been however, the opportunities ahead are still greater.

One of the key components to realizing these opportunities will be the development of more effective methods to recruit young engineers. It is an appalling situation where less than 10% of the high school graduates have the background for engineering. This situation is made even more severe by the teacher shortage.

There are many "rocks in the road to professionalism." We still have the problem of defining what an engineer is, although a big step forward has been made in the engineer registration systems that have been set up in most states. The matters of proper salary status and professional recognition must be given close attention. No less important, the engineer must move toward a fuller acceptance of his responsibilities.

Paul H. Robbins, executive director, National Society of Professional Engineers.

Object of Recruiting Program

ACCURATE FIGURES on the number of qualified fuel engineers employed by the coal companies, associations, railroads, and equipment manufacturers are not easily obtainable. However, those figures which are available indicate that the needs of the coal industry in the near future will not be satisfied.

Unless necessary action is taken to interest recent graduates in coal industry fuel engineering there will be insufficient engineers available to need worry about

how to use them. Corrective action to overcome this condition could include the following:

1. The establishment of scholarships and fellowships at the universities which have curriculum which includes coal technology. Several such scholarships have already been arranged, but the number is far too meager.

2. Summer vacation employment of engineering undergraduates by coal companies and coal industry associations engaged in fuel engineering would serve to stimulate the interest of the undergraduate and would provide the potential coal industry engineer with valuable training. During the past summer, BCR employed two such engineers, and it is planned that three will be employed this summer. We have found that a definite interest in the coal industry can be established, and in addition these young men have been extremely helpful in the conduct of our work.

3. On-the-job training with coal companies for recent graduates would provide the opportunity for older engineers to impart to the new man the experience they have gained through their various contacts.

4. The setting up of training programs with industry associations such as BCR and NCA, wherein engineering graduates could obtain practical knowledge of coal utilization, would enable better training of the potential coal industry fuel engineer. Such programs could include lectures by experienced fuel engineers as well as on-the-job training through work with various types of coal-burning equipment.

James R. Garvey, assistant director of research, BCR.

THE SUPPLY OF ALL ENGINEERS will be short and fuel engineers especially so during the next 10 yr.

An expanding coal industry will require more fuel engineers in the future than it did in the past.

The coal industry will be at some disadvantage in attracting young engineers because of the glamour of the newer fields.

The coal industry must offer more opportunity and incentive to attract engineers into this profession.

The industry will be forced to pay higher starting salaries and establish higher wage ceilings to get its share of the supply of engineers to fill its needs.

As a result of the above conclusions the coal industry must:

1. Encourage more young men to enter college curricula that will prepare them for fuel engineering. This might be accomplished by such inducements as college scholarships, summer work, etc. Already there has been some progress along this line because during the last 6 mo five scholarships for freshmen have been established at Penn State's curriculum in fuel technology.

2. Establish a well organized industry-wide training program for graduates in engineering. This might be best conducted by some central organization such as the American Coal Sales Association or National Coal Association. This training program should be of one to two years' duration and include instruction covering the field completely. It should include training at the combustion equipment companies, handling manufacturers, control and instrument companies, utilities plants, general industrial sites, etc.

3. Consider fortifying the fuel engineering profession by establishing professorial chairs at colleges and universities. This will help maintain better campus salaries and thus a higher caliber teaching nucleus. The academic engineering situation is critical and something must soon be done to encourage good teachers to enter or stay in this profession.

4. Conduct a more aggressive recruiting campaign to educate and attract high caliber engineering graduates.

T. S. Spicer, professor of fuel technology, The Pennsylvania State University.

Vital to Railroads

IN RECENT YEARS, the importance of the fuel engineer to railroad management has grown by leaps and bounds. He performs a critical liaison function between the management and selling operations. His tasks include keeping management alert to technological advances in coal, and alternate methods of transport. He also advises on planning, advertising, fuel market, and competitive problems.

George R. Ritchie, coal traffic manager—engineering, The Chesapeake & Ohio Railway Co. (speaking in the absence of O. L. Scales, executive vice president, Enos Coal Mining Co.).

Needs Sales Sense

THE FUEL ENGINEER has his headquarters with management. He is the bridge between the salesman and the technical requirements of the plant. He must know preparation and have good sales sense. His functions are both line and staff. On the line, he makes plant surveys and aids salesmen in answering complaints. On the staff, he determines coals for market needs, assists in the evaluation of prospects and competitors, and advises on advertising and research programs.

Carlton R. Mabley, Jr., vice president, Island Creek Coal Sales Co. (speaking in the absence of O. L. Scales, executive vice president, Enos Coal Mining Co.).

Feature Talks

Insurance for the Future

RESEARCH is the great creative constructive force in our time. Research to get the facts and apply those facts for the solid foundation of our future. Research to solve our future needs for power and energy, research to develop and sharpen our creative minds, research to discover and shape our ideas and ideals.

Research, even research effort, cannot be measured in dollars. No yardstick yet exists to measure this great constructive and creative force. But even with a dollar measurement, crude and inaccurate as it is, we are impressed with the record. Some $40 billion has been spent in this country on research effort since the Declaration of Independence, and the National Science Foundation points out that half of that effort has been made since 1949 or 1950. Remembering that 5 to 7 yr must pass before research effort is felt in the market place in new products, new processes, greater profits, and almost that long for new weapons of defense or offense, we have not yet begun to feel the effects of the second half of our research investment. That is, indeed, a startling observation.

May I ask you then to examine your own position as leaders of a most important basic industry. Are you now investing in creative effort on a sufficient scale to keep your individual company and industry position? Are you meeting your obligations as custodians of one of our most precious natural resources? Are you preparing to meet the great and urgent demands just around the corner for the fuel and energy you control?

I do not know the answer. Each of us must continue to be alert to our opportunities and to our responsibilities and obligations. We want to avoid a criticism from our own future—in the words of Isaiah—why did the people of 1956 imagine a vain thing?

The structures of power we build today through research will house our existence tomorrow: The power to run our industry and commerce, the power of creative brains, and the power of our collective ideals and visions. Our tomorrow comes quickly—not a century away, not a half-century away. We have a limited number of years to prepare for it.

Dr. Jesse E. Hobson, former director, Stanford Research Institute.

Coal Capturing Aluminum

THROUGH ITS ABILITY to produce low-cost electricity, bituminous coal is capturing the market from water and gas-based power for the manufacturer of aluminum.

The secret of the enormous growth of the aluminum industry has been the maintenance of a relatively low selling price in the face of increases in price of competing materials. In order to maintain these prices, it has been necessary to obtain low-cost electric energy in the large amounts required for the reduction of aluminum.

The reason for the aluminum industry's present rush to coal for its power is the fact that utilities can now offer the aluminum producers "firming-up" power in sufficient amounts, and over a long enough period of time, to allow them to amortize the huge plant investments at a reasonable cost per pound of aluminum. In addition, aluminum plants can be located close to aluminum consuming centers. The combination of relatively low-

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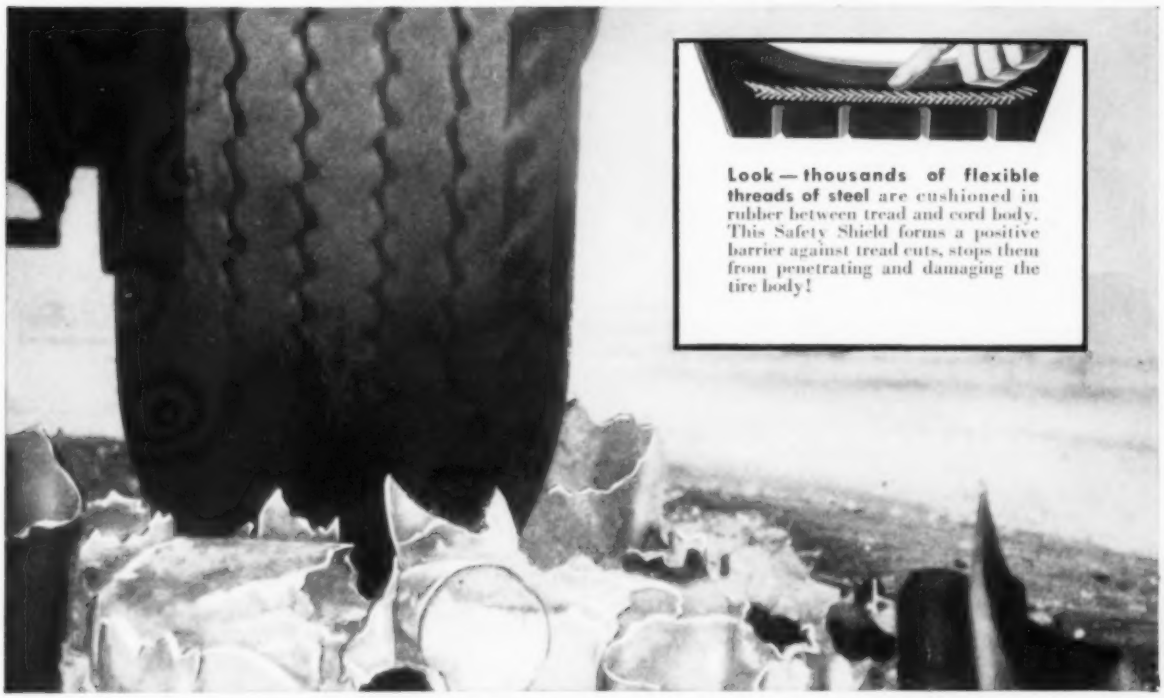
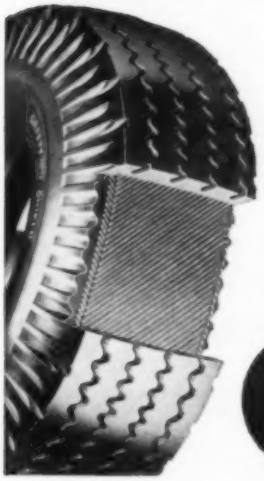
by new exclusive SAFETY STEEL SHIELD



Look — thousands of flexible threads of steel are cushioned in rubber between tread and cord body. This Safety Shield forms a positive barrier against tread cuts, stops them from penetrating and damaging the tire body!

U.S.ROYAL Truck Tires



You are looking at an entirely new kind of highway truck tire. It combines the strength of *steel* with full flexibility, light weight and soft ride—without increased inflation.

Because this new U.S. Royal is *invulnerable* to cuts and ruptures in the vital tread area, it gives you the longest, most trouble-free service in truck tire history. Because steel cord shields its carcass, it remains undamaged for more safe recapping, making it the most economical of truck tires.

You'll find new U.S. Royals like this cost *surprisingly little*. Ask your U.S. Royal Dealer now. And remember—you can specify them on the new equipment you buy!

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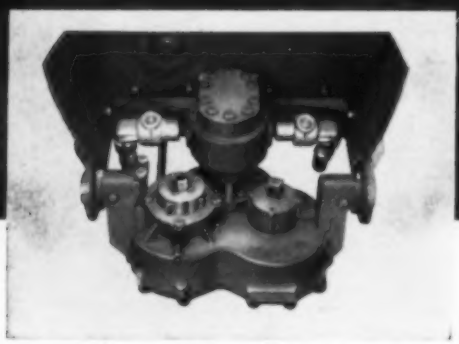
IT'S AN EFFICIENT WORKER

this 56-RDR roof drilling machine

Unit has M.S.A. dust collecting system. Trolley pole type arm holds dust collector in position against the roof. Note tanks mounted on machine.



Closeup shows twin drives for drilling and roof bolt tightening.

Tightening a roof bolt to secure the roof. Whether drilling or bolting, controls are easy-to-reach.

One unique feature which makes this Jeffrey unit efficient is the twin drive on the boom. One drive provides for high speed drilling; a second drive furnishes the right torque for tightening roof bolts. Each drive is designed specifically for its job.

The Jeffrey 56-RDR is efficient, too, because of its long reach. The drill arm swings 10′ 9½″ right or left of center. More holes can be drilled with fewer moves.

Another efficiency feature is the controls which are located on the boom within easy reach of the operator. Included is a slow tram speed control which permits "inching" when spotting holes.

For more information, write to The Jeffrey Manufacturing Company, Columbus 16, Ohio.

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cost power and low freight on the finished product to the market is an attractive package.

Coal producers should continue their record of producing fuel cheaply, and to work toward further improving the overall efficiency of transforming coal to power. Today the market for coal is improving and the great potential for coal lies in its better utilization. The coal industry has recaptured the aluminum industry by improvement in the efficiency of burning coal, and many more industries can be captured for coal in the same manner.

Arthur F. Johnson, mining engineer, Olin-Mathieson Corp.

Coal Vital to Steel Expansion

DESPITE THE PROGRESS made by the electric furnace and oxygen converter process, the open hearth will be with us for many years. Capacity that cost the steel industry around $65 a ton to install originally, will not be quickly discarded. New capacity costs over $300 a ton, so it pays to modernize and expand existing equipment.

Any forecasts today on future coal consumption in the steel industry are indeed hazardous. The industry is using every means at its disposal to get more iron out of its blast furnaces through better preparation of ore, higher grade ore, use of more sinter and better all-around operating practice. Only a few years ago, it was pretty much accepted that it required 1,850 lb of coke to produce a ton of pig iron. The exact figure for 1950 was 1,844 lb. The pressure is on to reduce that figure substantially. In 1954, it required only 1,746 lb and the average now may be even lower. Some people in the steel industry think that 15 yr hence it will be using relatively little more coal than today.

Sintering, of course, takes fuel and studies now are being made of the economics of anthracite coal versus coke breeze. Anthracite has gone up in price this year and is expected to go up again in 1957. Some steel people think it will be cheaper to turn to coke before too long.

Currently little interest is shown in the experiments of the Bureau of Mines with the use of anthracite in the blast furnace. Best results were obtained using 40% anthracite and 60% coke. A higher proportion of coal brought operating headaches. Steel people say the price of anthracite must be reduced before they can get interested.

The steel industry by no means has all the final answers on the best way to make steel. However, you can be assured that it will adopt the most modern, yet economical methods available. It will be spending over a billion dollars a year on plant facilities for some time to come.

Coal will play a very vital role in the transition and expansion in steel. But the extent of your participation will depend largely on how much time and money your industry spends on technological and market research.

Irwin H. Such, editor-in-chief. *Steel.*

BCR Reports

1955 Highlights

EMPHASIS was placed during 1955 on the development of automatic steam generators for bituminous coal. The broad objective has been to develop coal-fired package boilers in the size range up to 20,000 lb of steam per hour, for commercial and industrial space heating, process steam and process hot-water applications.

In its 1955 program, BCR proved the feasibility of designing, building and operating compact steam generators which will burn a wide range of coals and which can compete favorably with package-type units burning other fuels. Two types and sizes of automatic steam generators were laboratory tested during the year, and a third unit was designed and placed on order.

Reliable, economical and convenient coal-and-ash handling facilities are so important that BCR conducted several related projects in 1955. Among these:

1. Two new BCR "Aids to Industry" publications manuals were started to aid architects, consulting engineers and contractors in the design of coal-and-ash storage and handling facilities for modern coal-burning steam plants. The objective is to provide automatic operation of such facilities at a capital cost appropriate to the size of plant. The general title for both publications will be "Coal and Ash Storage and Handling." The first one should be ready for distribution in June and will have the sub-title, "For Plants Using Less Than 5,000 Tons of Coal Annually." The second manual will be available shortly thereafter, "For Plants Using 5,000 to 30,000 Tons of Coal Annually."

2. A fundamental BCR study was begun to develop an engineering basis for coal-bin design. During the planning stages of this project in 1955, BCR consulted with electric utilities, equipment manufacturers, coal-industry fuel engineers, and other individuals experienced in bulk-flow problems.

3. Also, a jointly-financed project on aerated coal handling was conducted by BCR's locomotive development and general research programs at the Columbus laboratory. The results of this project showed that when air is passed at low velocity through a bed of crushed coal, the angle of repose is reduced from about 50 deg to as low as 2 deg, and there is a large increase in the rate at which coal flows from the bin. The aerating velocity with dry crushed coal is so low that carry-over of fines in the air is negligible.

This development has important possibilities, not only for the discharge of crushed coal from flat-bottom bunkers, but also for integrated systems of transporting, storing and handling small coal. It is adapted to handling coal fines with not over 1% surface moisture, having a top size of ⅜ in or less, and with 30% or more of minus 50 mesh fines. This suggests a valuable outlet for coal fines as an essential component of specification fuel sold for aerated handling.

The disposal of fly ash from pulverized coal was formerly a nuisance and expense. It can now be an attractive credit item. For several years, BCR's Pittsburgh staff has been stimulating research, development work and field trials which are helping to create important markets for fly ash.

Because of its pozzuolanic properties, fly ash is being used in large tonnages to replace a substantial percentage of Portland cement in concrete for dams, bridges, building materials, highways, etc. The resulting concrete has advantages in handling; in strength and other physical properties; in resistance to soil chemicals, sea water, etc.; and in cost. Great interest is also developing in improved techniques for sintering fly ash to make strong, lightweight aggregates.

Retail deliveries of coal were 53,762,000 tons in 1955, a 2.2% increase over the preceding year, and much of this tonnage was used for residential heating. BCR continued several projects relating to this market, including the Stokermatic Heater, the Coal-O-Matic Furnace and the BCR Downflow Stoker.

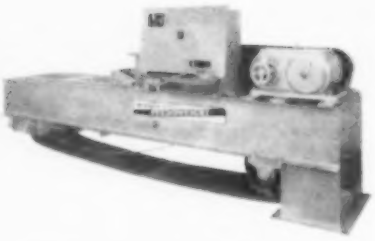
During 1955, much additional work was done at BCR's Pittsburgh laboratory on a broad technical and market study of present uses and future requirements for coal, coke and electric power in the metallurgical, chemical and other process industries. In this study some 3,000 recent technical and statistical articles were examined to determine trends and market opportunities which can be of major importance to the coal industry.

Field Testing Ahead

IN OUR REPORT of last year we pointed out that the primary emphasis during the coming year would of necessity be on applied and exploratory research. This research was defined as that dealing with the application of known principles and ideas to the immediate solution of several of the most pressing problems of the coal industry. It was further explained that this program would not include any research of a basic nature such as it needed to originate new ideas, nor would it include more than a limited amount of the field work that is so essential to the final development of new equipment.

At this meeting here today, 2½ yrs after the dedication of the Columbus laboratory, we can look back at a steady growth in our research accomplishments. And we can look into the immediate future and examine the means by which research results will be utilized and new ideas devleoped. Whereas a year ago we were concerned only with laboratory research of an applied nature, we feel now that sufficient progress has been made to move out of the laboratory into field testing. In addition, we believe our program can be expanded to include the preliminary stages of investigation of several ideas of a more fundamental nature. It is hoped that these investigations will indicate the way for the solution of additional industry problems.

J. R. Garvey, assistant director of research, BCR. *(Continued on p 144)*



Yes-feed by weight

with the MERRICK FEEDOWEIGHT, a self-contained automatic conveyor scale, with automatic gate for feed rate control. Powered feed regulator operates gate, without restraint on scale beam. Uniformly feeds bulk material BY WEIGHT; automatically totalizes weight of materials fed. Simple to operate. Slow moving parts mean long life. Easy to install, maintain.

Manufacturers of

The Merrick WEIGHTOMETER, which weighs any material carried on a belt conveyor without interrupting conveyor operation. Complete descriptive matter on request.

MERRICK SCALE MFG. CO.
Engineers and Mfrs. of Automatic Weighing Equipment
PASSAIC, N. J.

BCR Conference *(Continued)*

Techno-Economic Research

THE BASIC OBJECTIVE of Bituminous Coal Research, Inc., is to help its members make money from the production, transport, sale, or use of coal. Under the general research program, this involves primarily the development of coal-using equipment and methods, and making information about these products or processes available to BCR members, their customers, and in enlisting manufacturers' interest.

Any equipment development depends for its success on things which are technically possible and things which are economically practical. What is decided to be the best product may not be the best that can be built from a technical standpoint or the most economical to produce. Business weighs two types of factors—customer desires and the size of the market—and decides what combination gives the best profit-making possibilities.

The procedure that helps us to understand the make up of markets and the nature of engineering and economic demands placed upon us as a company or industry, we at BCR call "techno-economic" research.

If your company desires early answers to techno-economic problems which BCR's income has not permitted it to budget, BCR stands ready to discuss the possibility of arranging a project under your sponsorship. The results of such projects must be important to the coal industry and beneficial to BCR members whose support guarantees BCR's operation, and staff must be available for assignment to the project desired.

J. W. Igoe, assistant director, administration.

Complete Mining System

SOME WORK is being conducted on virtually very phase of a complete mining system and if successful, it should bring about a substantial reduction in the cost of producing coal. Unfortunately, solution to a complete mining system, even after the basic principles have been evolved require a long time and substantial amounts of money to put into a form to be used in coal mines.

One of the newest experimental projects of the Mining Development Committee is a conveyor which will convey from zero to 600 ft without interruption and in its final form should permit the operation of this conveyor without the use of man power. The new concept of transportation utilizes the basic idea of a trolley conveyor or monorail. The trolley conveyor, a by-product of the automobile industry, has heretofore been considered as being limited to unit and package conveying only.

The Mining Development Committee studied the trolley conveyor and felt that it could be adapted to the continuous transportation of coal. If successful, it should eliminate many of the limitations of belt conveyors and mine cars and have a lower capital cost. The trolley conveyor can also be used for surface transportation making accessible many coal fields currently too far from commercial transportation to be economically mined.

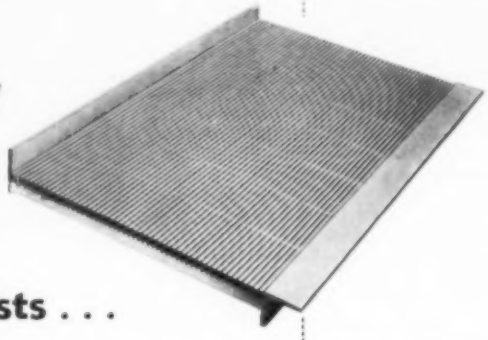
A fully automated mining system from the face to the surface could bring the cost of labor for the production of coal down to an amount approaching that enjoyed by the process industries. Technically, it is possible to reduce labor costs by something approaching $1 per ton. Since we produce something over 300 million tons of coal by underground methods, that would represent savings in excess of $300 million per year.

Since the technical know-how exists, it would be possible to conduct a crash development program which would bring these technical results into practical application. Such a crash program would be expensive. It might be as much as $10 million per year for a period of 6 to 10 yr.

For a number of reasons, it appears that only about one-half the industry will support cooperative mining research, therefore the cost of such a program would need to be borne by 150 million annual tons of production. If the program were to cost $10 million per year, it would cost about 6.7c per ton per year or a little more than what the subscriber is currently paying for power to operate his coal mines. Despite the limited funds made available by the industry, substantial progress has been made. It is for the industry as a whole to decide the rate of future progress.

Gerald von Stroh, director of develop-

sure way to cut screening costs . . .



Replace your present screens with Hendrick Wedge Slot . . . the continuous slot screen that can't be beaten for screening and dewatering operations. Hendrick Wedge-Slot has small openings yet affords far greater draining and screening capacity.

Profile bars are shaped to maintain uniform width of slot openings as wear progresses. Long screen life and high coal quality are always maintained. For information on the type of Wedge-Slot best suited to your particular operating methods, call Hendrick today!

Perforated Metal • Perforated Metal Screens • Wedge-Slot and Hendrick Wedge-Wire Screens • Architectural Grilles • Mitco Open Steel Flooring • Shur-Site Treads • Armorgrids • Hendrick Hydro Dehazer

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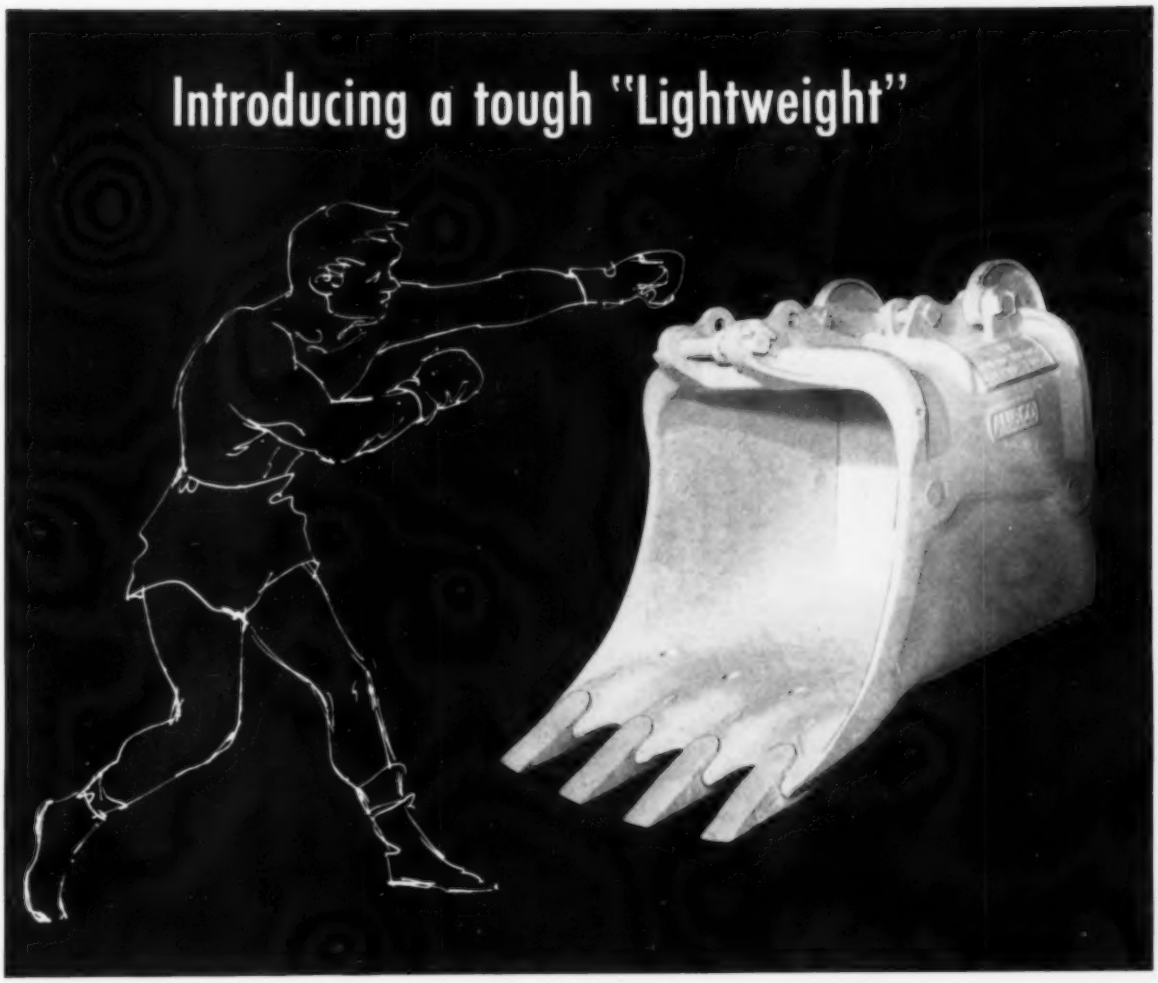

NEW Amsco® Manganese Steel LIGHTWEIGHT DIPPER

Rugged 3/4 yd. dipper, made of the "toughest steel known," actually work-hardens under impact

Those big, tough Amsco Dippers now have a smaller brother. With this new, rugged, lightweight dipper, small shovel operators can enjoy the combined advantages of long-wearing manganese steel and proved Amsco design features, such as:

- One-piece manganese steel back castings
- Arch formed by complete box section for maximum strength
- Teeth are set for clean, fast digging
- Interior is designed for rapid dumping
- Lugs for handle, back, and braces are cast integral with back—for extra strength
- 25% lighter than standard Amsco 3/4 yd. dipper, permitting use on light-duty shovels and allowing their developed power to be more fully utilized
- Curved door in back, for full-capacity loading with each pass

Ask your shovel manufacturer for full information—or write us direct for descriptive literature.

"Vital Statistics" on this new lightweight champ

Height of front over teeth	4 ft. 5/8 in.
Height of back	2 ft. 7 in.
Opening at top	2 ft. 5 in.
Opening at bottom	2 ft. 7 in.
Approximate weight	1550 lbs.

AMERICAN Brake Shoe COMPANY

AMSCO

American Manganese Steel Division • Chicago Heights, Ill.

OTHER PLANTS IN: DENVER, LOS ANGELES, NEW CASTLE, DELAWARE, OAKLAND, ST. LOUIS, JOLIETTE, QUEBEC

TWO TOOLS

that bring further automation to your coal production

In the coal industry, Simplicity Os-A-Veyor Feeders have proven themselves to increase operating efficiency and lower the costs of maintenance. Simplicity Os-A-Veyor Feeders are self-cleaning units which experience none of the carryback or spillage found in other types of feeders. They are designed to decrease bridging and provide even feeding. The oscillating action is provided by two eccentric shafts coupled to a single V-belt drive, leaving only one assembly and four bearings to lubricate. Os-A-Veyor Feeders can be either main frame supported or bin-hung by springs and cables.

Simplicity Grizzly-Feeders can cut your coal handling costs 50% because they combine two operations . . . scalping and feeding . . . in one machine. Old type feeder plus stationary grizzly are eliminated, thus saving you both plant room and operating and maintenance expense. Available in sizes from 2′ x 8′ to 6′ x 12′, and in capacities up to 1000 tons per hour, the Simplicity Grizzly-Feeder has already improved production for many coal operators, and can do the same for yours. This is a rugged, simply-designed unit that will give you maximum output with very little maintenance.

Write us for full information on both the Simplicity Os-A-Veyor Feeder and the Grizzly-Feeder.

Simplicity
TRADE MARK REGISTERED

ENGINEERING COMPANY • DURAND 19, MICHIGAN

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FOR CANADA: Simplicity Materials Handling Limited, Guelph, Ontario

FOR EXPORT: Brown and Sites, 50 Church St., New York 7, N.Y.

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BCR Conference *(Continued)*

ment, Mining Development Program, Bituminous Coal Research, Inc.

Coal-Burning Gas Turbine

THE 1955 TEST PROGRAM subjected the LDC gas turbine to long hours of operation at load factors far in excess of normal locomotive operating practice. The general operation of the plant was much more satisfactory than before.

In the 1955 test program, the LDC gas turbine test plant accumulated 1,421 hr of coal-fired operation in 83 days. At an average load of 2,894 hp (81.7% load factor), 4,111,400 hp hr were generated. A total of 2,250 tons of bituminous coal has burned. No lubricating oil was added during the 1955 tests. The value of this coal, including railroad handling charges and 1955 mine wage increases, was $11,300.

Locomotive diesel engines doing the same job would burn about 250,000 gallons of fuel oil. Allowing 6% of the fuel cost for the lubricating oil, total cost would be $28,745. The saving due to the use of bituminous coal at 20c per million Btu instead of diesel fuel at 83c per million Btu approximates $17,450.

In a locomotive year of 4,000 operating hours, the saving in fuel and lubricating oil cost would be about $49,000.

Peter R. Broadley, director of research, and William M. Meyer, assistant to the director, Locomotive Development Committee, BCR.

Effective Leadership

LEADERSHIP IS AN ART, and like any art it is individual. Personality, power of persuasion, clarity of expression, industry, and mastery of one's specialty are important factors, but character and sensitivity to human values are the major essentials of any leader, whether he is engaged in business, industry, education, or government service. The great leader understands and appreciates people. He shows his interest in and his respect for the individual in his organization by his kindness and courtesy, by his candor and fairness, his tolerance and understanding, by his optimism and unlimited patience. A friendly and appreciative attitude on the part of management leads to good organization morale.

The good executive knows the people who make up his organization and treats those in the minor as well as the major posts with equal consideration, constantly studying the individual's potentialities while endeavoring to uncover possibilities as well as actualities. He is loyal to those below him as well as to his superiors. He does not short-circuit or override, is always ready to praise and to reward merit, and is most careful not to place his subordinates on the defensive, or criticize them before others. He does not try to do it all himself, but delegates, supervises, and holds others for results. He knows what goes on and keeps subordinates as well as superiors fully informed.

A. A. Potter, president, BCR.

PROLONGED CONFINEMENT COUNTS

...when it comes to blasting efficiency

Preparing for "coyote" shot. Tunnel dug 50 ft. into hillside . . . then right-angled 25 ft. off trunk in either direction. Atlas explosives loaded at ends of "T" crossbar. Back-filled. Ready to fire electrically.

Prolonged confinement of blast keeps 8250 lbs. of explosives hard at work underground. Little wasted energy. Explosives force disintegrates hillside. Good displacement. Excellent fragmentation.

Huge, workable final pile. 25,000 yds. of well-crushed rock . . . broken into small fragments. Here's peak blasting efficiency . . . easy work for the shovel. It's the prolonged confinement that counts!

PROLONGED CONFINEMENT—the Rockmaster® way

How's this for breakage! For explosives efficiency! Here's a blast that really paid off—in good displacement . . . in quick, easy, economical removal.

When it comes to getting the most out of your explosives, it's *prolonged confinement* that counts! In this "coyote" shot, Roseburg Lumber Co., Roseburg, Ore., loaded 7750 lbs. of Atlas Flodyn and 500 lbs. of Atlas 40% Gelatin well inside the hill. Explosives force was confined to the burden . . . instead of blasting the air. The right combination of ROCKMASTER electric blasting caps and Atlas explosives shows—

- **good control**
- **improved breakage**
- **greater efficiency**
- **better public relations**

Before your next blast, why not go over your specific blasting problems with your Atlas representative? He has ideas and experience you can put to use . . . and profit from. And get "Better Blasting"—Atlas' informative newsletter on latest methods and materials. Write us to put your name on our mailing list today.

EXPLOSIVES DEPARTMENT

ATLAS POWDER COMPANY

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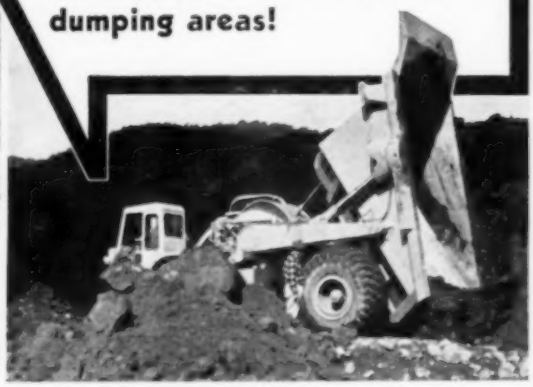
Cash-In on Tractor-Trailer

...with the *Athey* Trailer

REAR DUMP

for more maneuverability in restricted loading and dumping areas!



Fast, Clean Dumping — Positive, compact, efficient, hydraulic system lifts the body and dumps any load quickly and cleanly. Here's fast dumping in tight places where "rigid frame" units cannot maneuver!

With Cat-Athey Tractor-Trailer unit, you're flexible to meet the needs of your job. There are none of the limitations of a "rigid frame" unit. Thus, you can save time and money in loading, hauling and dumping. Above, for example, the Athey PR21 Rear Dump Trailer has unexcelled maneuverability in pioneering work, narrow benches and close quarters. No awkward backing into narrow loading or dump areas to slow up the job.

With the articulated, "universal-joint" design of the tractor-trailer unit, you maneuver "in" faster and "out" faster, in the most limited spaces. Then, too, Athey Rear Dump Trailers are matched and balanced to Cat DW20 and DW21 Tractors, assuring long life and low operating costs. You'll be money ahead if you "tailor" your hauling unit to best suit your job!

Speeds Loading in Tight Quarters — The Big DW21-PR21 Tractor-Trailer easily turns non-stop in a 34-foot cut. Wide, low body speeds shovel swings . . . handles more loads, faster . . . top maneuverability means top profit!

Athey

Flexibility and Performance,

"Tailor-made" for Your Job

SIDE DUMP

for faster operation on long hauls . . . non-stop dumps.

Built-in Stability, Non-Stop Dumping. The PD20 Side Dump Trailer keeps your production moving, dumps evenly and cleanly "on the roll". Big tires help compact the fill. Stabilizing jacks provide safety while dumping. One-way traffic saves time, prevents traffic tie-ups.

On long, fixed hauls, the Cat-Athey Side Dump unit combines maximum production and lowest cost. Loads travel along at speeds up to 32 MPH. On-the-move dumping at the fill . . . instant spotting at the hopper. No wasted time in stopping and backing to dump.

More even distribution of material at fills, into cars, or crushers. One-way traffic on cycles further speed up the job, and avoid hazards. The PD20 has built-in stability while dumping with self-contained hydraulic stabilizing jacks. Another advanced design feature from Athey's 33 years of engineering and manufacturing experience. It will pay you to investigate the high-speed, high-production PD20 Side Dump Trailer.

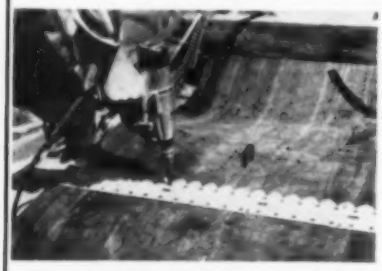
Clips Minutes Off Cycle Time — on the haul, at the shovel, and at the dump, the PD20 speeds up each operation. "Hi-ball" loads with safety at travel speeds up to 32 MPH. Wide target cuts down loading time. Athey Side Dump Trailer features save profitable minutes. It all adds up to faster production, more profit.

ATHEY PRODUCTS CORPORATION

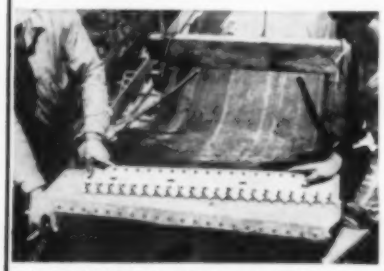
5631 West 65th Street, Chicago 38, Illinois

NEW
FLEXCO
SPEED TOOLS
CUT APPLICATION TIME
IN HALF

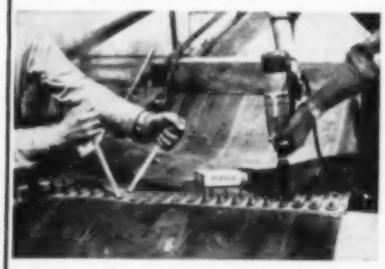
Your two man belt team can now join a belt 30" wide in 15 to 20 minutes . . . using the new FLEXCO Power Tools.



The FLEXCO Power Tool Boring Bit used with electric or air impact tool speeds boring of holes.



New FLEXCO Templet positions bolts for quick joining of belts. Reaching under belt has been eliminated.



Running down nuts is fast with the new FLEXCO Speed Wrench used with electric or air impact tool. Two Bolt Breakers are used together to complete the joint.

If you are interested in speeding up fastener application, order the new Speed Tools from your local FLEXCO Distributor. Write for Bulletin F-112-A.

FLEXIBLE STEEL LACING CO.

4638 Lexington Street • Chicago 44, Illinois

Personal Notes

With the announcement last month that it had divided the Gary and Lynch district, making it two, U. S. Steel's Coal Division appointed **Thomas E. Johnson**, a district superintendent, to head the Lynch operation and retained **Woods G. Talman** as general superintendent of the Gary district.

Dr. Charles E. Lawall, university president and coal mining engineer, has been made vice president of coal traffic and development by the Chesapeake & Ohio Ry. Dr. Lawall, who had presided at West Virginia University for 7 yr, joined C&O in 1945 as coal properties engineer.

David L. Francis, president of Princess Elkhorn Coal Co., Huntington, W. Va., has been elected to a 2-yr term as a director of the United States Chamber of Commerce.

Albert B. Hood has been appointed superintendent of Duquesne Light's Warwick mine, Greensboro, Pa. Mr. Hood began working for Duquesne Light in 1943. Before his appointment he was production engineer. He has also served as mining engineer and acting face boss.

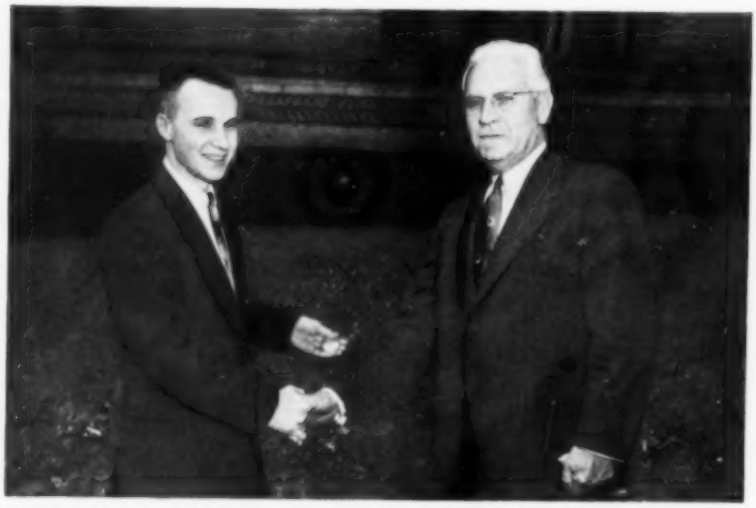
T. C. Hamill began serving the Sycamore Coal Co., Huntington, W. Va., last month as a vice president. At the same time **P. A. Pilkenton**, the company secretary, began as treasurer. Both men were elected to the posts during an April meeting of the Sycamore board.

George N. England, secretary and treasurer of Glen Alden Corp. since its formation in 1921, has been named financial assistant to **Francis O. Case**, president. Mr. England, a resident of Scranton, Pa., has served Glen Alden and its predecessor, the Delaware, Lackawanna & Western RR for 57 yr.

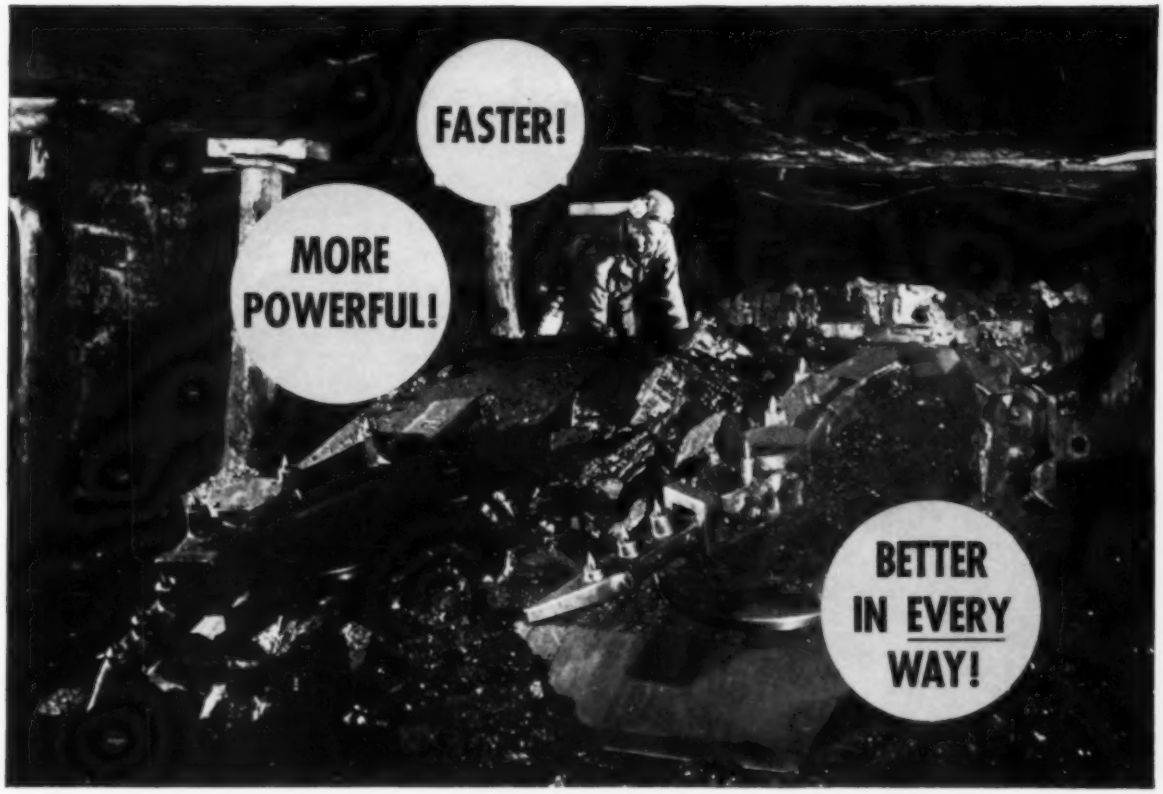
W. A. Haslam, Mt. Hope, W. Va., has been advanced to the presidency of Winding Gulf Coals, Inc. He succeeds **J. A. Hunt**, Beckley, W. Va., who will continue to serve in a consulting capacity. Mr. Hunt has served the coal industry for 28 yr in the New River and Winding Gulf fields. Mr. Haslam has been with Winding Gulf as executive vice president since December. He was formerly vice president of operations for the New River Co.

E. Y. Clausen, New Canaan, Conn., was elected board chairman of the Peerless Coal & Coke Co., Bluefield, W. Va., at the company's annual meeting in New York. At the same time **Roland C. Luther** was raised from executive vice president to president; **E. C. Luther Jr.** was reelected vice president and **B. A. Workman**, Vivian, W. Va., was reelected general manager. Mr. Workman announced the appointment of **P. Z. Rutschow** as assistant general manager and **Vance Price** as superintendent of mines, Vivian, W. Va.

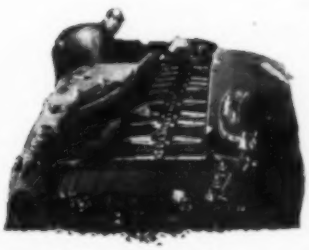
Hugh B. Lee, president of Maumee Collieries Co., Terre Haute, Ind., was awarded the highest tribute of Ohio State University's College of Engineering. The "Distinguished Alumnus Award" was conferred on Mr. Lee, who is considered a pioneer in the development of large-scale dragline stripping practices. He has operated 31 mines in this country, Canada and Mexico and joined Maumee Collieries Co. in 1923.



"OUTSTANDING ENGINEER" is the description for Anthony Sossong (left), University of Pittsburgh senior, who was presented with a gold watch by the Old Timers Club for being an outstanding student of coal mining engineering. Mr. Sossong was given the watch (photo) during a campus ceremony. L. C. Campbell, vice president of Eastern Gas & Fuel Associates and president of the National Coal Association, made the presentation.



JOY *SUPER* 14-BU LOADER



Performance—coupled with unrivaled simplicity of design and durability in service—made the 14-BU the world's most widely used loader in medium-low coal. Now, in the SUPER 14-BU, performance has been stepped up even higher . . . the machine can get in and out faster, load more coal and stay on the job better than ever before.

For example, horsepower is increased from 40 to 65 HP. Peak loading capacity is stepped up 20%, and the high tramming speed almost 50%. All mechanical and electrical components have been beefed up to match the oversize horsepower motor, and reduce maintenance costs. The conveyor chain speed is increased to more than 300 FPM—up about 30%—and the chain itself has 45% greater tensile strength. The loader actually weighs about 900 lbs. more, but heights are unchanged at 30½", 33" and 36".

Add extra advantages like those to Joy's famous gathering mechanism and exclusive Magnetax control—features that have been field-proved in every coal mining area in the world—and you have the kind of easy-operating, heavy-duty, high production loader that means increased tonnage and reduced costs for you. ● Let us show you what SUPER 14-BU Loaders or other Joy Mechanized Equipment can do to improve your profit margin! ***Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.*** In Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*

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New help in selecting finest mechanics tools . . .

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Snap-on Tools
"THE CHOICE OF BETTER MECHANICS"
FOR PRODUCTION, MAINTENANCE, AND SERVICE WORK THROUGHOUT ALL INDUSTRY
SNAP-ON TOOLS CORPORATION

Snap-on TOOL CATALOG

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SNAP-ON TOOLS CORPORATION
8132-F 28th Avenue, Kenosha, Wisconsin

Personal News *(Continued)*

E. H. Greenwald, Sharples, W. Va., has resigned as general manager of Boone County Coal Corp. to join the Pittsburgh engineering firm, Eavenson, Auchmuty & Summers. Mr. Greenwald will be succeeded by **R. F. Wesner,** Boone County Coal's chief engineer. Mr. Wesner's title will be acting general manager.

A. H. Clay, plant safety inspector at Eastern Gas & Fuel Associates' Eccles mine, W. Va., ended 40 yr of service in the coal industry and in one mine with his retirement June 1. Succeeding Mr. Clay is **Leonard Mabry.** Mr. Clay began his career with Eccles as a water boy in 1910. He served as pumper, brakeman and motorman before acquiring his first supervisory job in 1928, a date when he was raised to transportation foreman.

Obituaries

George Dove, formerly mine superintendent at Alpoca, W. Va., for the Slab Fork Coal Co., died last month following a heart attack.

Association Activities

A. B. Foulger, vice president and general manager of the Lion Coal Corp., Ogden, Utah, has been elected president of the Utah Coal Operators Association. He succeeds Oscar A. Glaeser. At the same time the association elected W. J. O'Connor, president and general manager of the Independent Coal & Coke Co., to the post of vice president.

MEETINGS

Open Pit Mining Association; 12th annual meeting, June 7, Bradley University, Peoria, Ill.

National Coal Association; Convention, June 13-14, Shoreham Hotel, Washington, D. C.

National Mine Rescue Association, Benton, Ill.; spring meeting, June 23, West Frankfort Country Club.

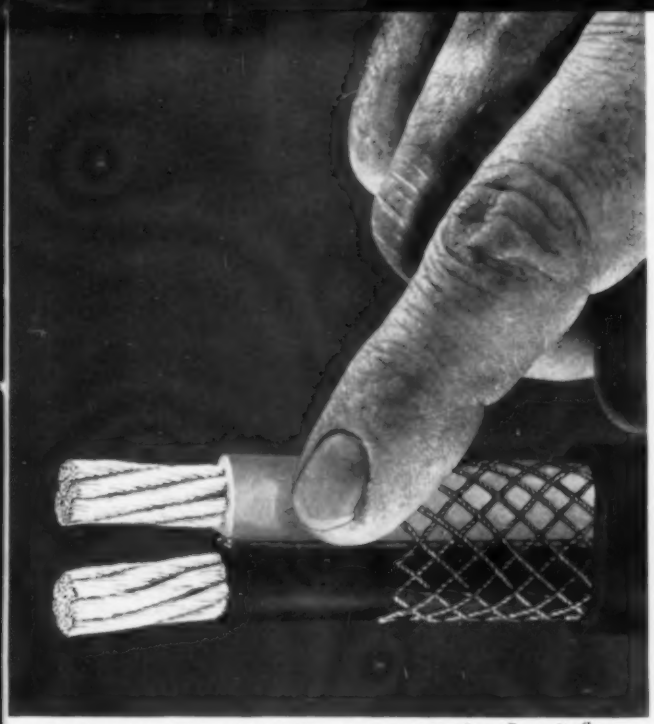
Rocky Mountain Coal Mining Institute; 52d regular meeting, June 17-20, Hotel Colorado, Glenwood Springs, Colo.

West Virginia Coal Mining Institute; spring meeting, June 22-23, Prichard Hotel, Huntington, W. Va.

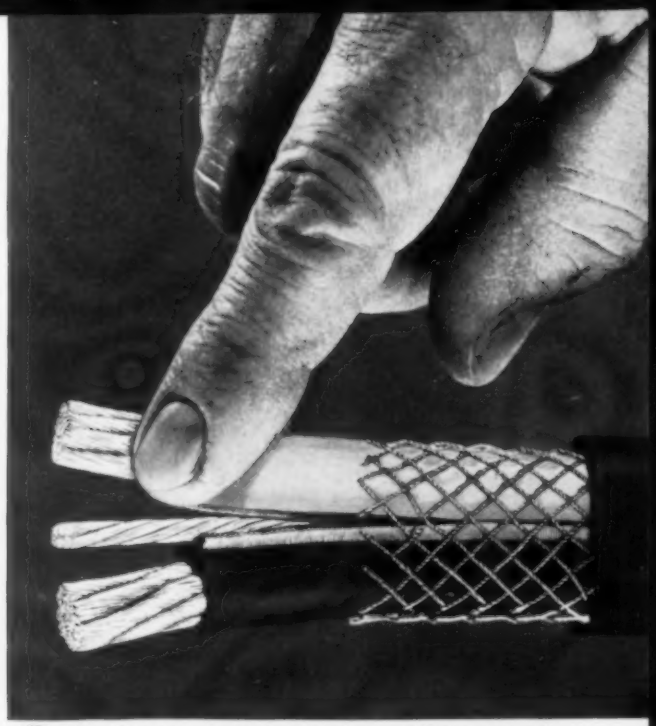
American Coal Sales Association; Convention, June 28-July 1, Greenbrier Hotel, White Sulphur Springs, W. Va.

Coal Conference; Gordon Research, American Association for the Advancement of Science, July 2-6, New Hampton School, New Hampton, N. H.

ASME-ASLE Lubrication Conference; Oct. 8-10, Chalfonte-Haddon Hall, Atlantic City, N. J.



1 **New neoprene insulation compound** gives Securityflex cable physical toughness on the INSIDE as well as the outside . . . resistance to puncture, flame and crushing.



2 **New flat stranding of grounding conductor** prevents broken wires – thus assuring continuity of operation. Full 50% wire gives peak electrical protection.

2-YEAR STUDY GIVES YOU A

New Triple Protection

shuttle car cable

Before designing the new Securityflex* cable, Anaconda engineers checked thousands of shuttle car cables of all makes to see why they failed.

They found the jacket often looked fine, but constant bending, flexing or excess tension had broken insulation or snapped conductors. To combat cable "heart failure"– Anaconda's new Securityflex cable provides *triple protection inside* to match tough outer strength.

3 New Advantages

1. Rugged high-grade neoprene insulation greatly increases resistance to puncture, flame and crushing.

2. Improved stranding of ground and power conductors prevents broken wires–assures continuity of ground.

3. Nylon breaker strip increases short circuit protection. Nylon jacket reinforcement also adds to cable strength and prevents wicking of moisture.

Full 50% Grounding Wire

In addition–full, 50% grounding wire insures greater electrical protection, longer life, and extra safeguard against excess tension. Anaconda's flat, service-proven grounding wire allows more cable on reel–will not cut insulation if cable is crushed by runovers. Millions of feet of new Securityflex have been sold without a reported failure of grounding conductor. Insist on full-size grounding conductor for safety.

Ask the Man from Anaconda or your distributor for details. Anaconda Wire & Cable Company, 25 Broadway, New York 4, N. Y.

*Reg. U. S. Pat. Off. 5610

3 **New nylon Anti-Short Breaker Strip*** gives Securityflex amazing crush resistance . . . minimizes short circuits between conductors even under heavy impact.

ASK YOUR ANACONDA® DISTRIBUTOR FOR MINE CABLE

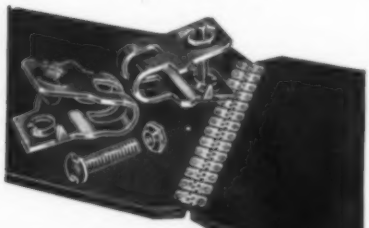
HINGED PLATEGRIP
BELT FASTENER No. 500

FOR HEAVY CONVEYOR BELTS OF CHANGING LENGTH

These heavy-duty belt fasteners make a strong, flexible joint in conveyor belts, belts of any width and of from 3/16" to 1/2" thickness. They offer special advantages in mines, quarries or industrial setups where length or position of belt is frequently changed, because sections can be removed or added at will. Joints are opened for this purpose by simply pulling out the hinge pin.

Easily and quickly applied on the job or in the shop. Special design gives deep compression into belting and smooth, flush joint.

Write for Circular



ARMSTRONG-BRAY & CO.
5340 Northwest Highway CHICAGO 30, U. S. A.

Among the Manufacturers

In Peoria, Ill., Caterpillar Tractor Co. announced that it would build a new plant in Aurora where four models of Caterpillar machines (crawler tractors, 'Traxacavators' and tractor shovels) would be built. Caterpillar announced no costs, saying only that construction would begin this month and that production had been scheduled for the "earliest practicable date." The new plant also will permit the company to expand its capability to make tractors and diesel engines in the Peoria plant.

In Wynnewood, Pa., William B. Stephenson, a vice-president of the Allen-Sherman-Hoff Pump Co. succeeded Homer E. Allen as president. Mr. Allen moved over to occupy the A-S-H board chair as **Fred S. Stow** followed Mr. Stephenson into the vacated vice president seat. Mr. Stephenson had been with A-S-H since his graduation from Pennsylvania State University in 1933.

In Scranton, Pa., Andrew V. Chandler formed the Rotary Drilling Equipment Co., Inc., (221 W. Olive St.) to manufacture drill rods, stablizers and bit adapters and to distribute rotary drilling machines and equipment among the eastern states.

U. S. Rubber's Baltimore sales manager of industrial rubber products, Henry Davis, Jr., was placed in charge of the company's Pittsburgh district. Douglas M. Smith, a salesman, succeeded Mr. Davis in Baltimore.

Big Sandy Electric & Supply Co., Inc., Pikeville, Ky., was appointed an authorized mining tool distributor by the Carboloy Dept., General Electric Co., Detroit. Big Sandy will distribute roof drills, coal augers, finger bits and special drills.

Rod Eagan, for 40 yr an associate of the Goodman Mfg. Co., has retired. He will be replaced by Clarence Graham, a Goodman employee for 19 yr. Mr. Eagan served Goodman in the replacement parts department and the advertising department. He is considered an authority on coal's mechanization and is as familiar with today's continuous miners as with the breast type cutting machine used many years ago.

Continental Gin has consolidated its Special Products Div. and Industrial Div. under the name "Industrial Division." **George C. Morgan** will direct.

Milton T. Smith was elected president and general manager of the Marion Power Shovel Co. and its subsidiary, the Osgood Co. Formerly vice president and general manager. Mr. Smith joined the company in 1954. Prior to that date he had been with Bucyrus-Erie Co.

Alvin E. York will manage parts and service and Alva L. Arend has been appointed parts supervisor of Clark Equipment Company's Construction Machinery Div. Mr. York was with Link-Belt Speeder Corp. before joining Clark. Mr. Arend, a Clark employee since 1947, was formerly service parts buyer and supervisor of service parts inventory control.

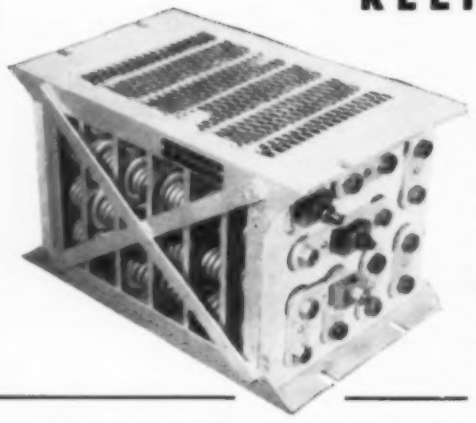
James L. Hamilton, Jr., has joined the Mead-Morrison Div. of the McKiernan-Terry Corp., Harrison, N. J., as a sales engineer. Mr. Hamilton has been assigned to the company's Chicago sales office.

Marion Power Shovel expanded its sales organization in the central states and put E. E. McCartney, Jr. in charge as central sales manager. Headquarters is in Chicago. Three divisional sales managers **L. G. Currie, W. A. Shay, Jr.** and **R. B. Falck,** will work in Illinois, Michigan, Wisconsin, Indiana and Kentucky.

Thomas T. Pattison, former district sales manager, Western Kentucky Div., National Mine Service Co., Madisonville, Ky., and **Ray Light,** former manager of the Mine Lamp Div., Beckley, W. Va. will be transferred to executive sales headquarters in Pittsburgh, Pa., as sales

LOCOMOTIVE RESISTORS

RUGGED-RELIABLE



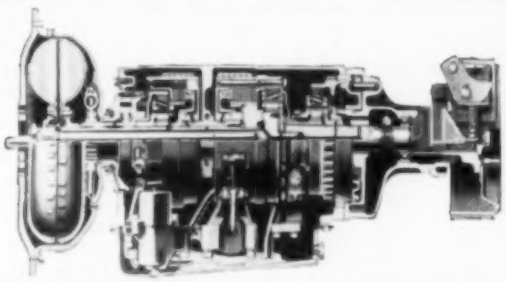
● Have ample resistance to start locomotives smoothly on the first point and sufficient capacity for long life. No special frame construction is necessary. Just mount the units in place and connect controller leads.

Write for GUYAN Bulletins. We supply a complete line of resistance products.

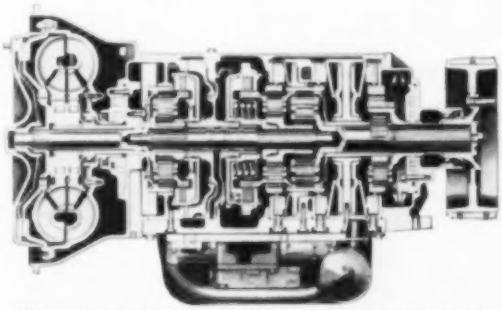
GUYAN MACHINERY CO. LOGAN W. VA.

Now there's a great automatic transmission for whichever Chevy truck you choose

Famous Chevrolet *Hydra-Matic*, or all-new *Powermatic*, provides easy, safe automatic driving that's tailored for your truck!



Hydra-Matic—optional in Series 3000 and 4000 models at extra cost—brings new ease to tough jobs, cuts hauling time and maintenance expense.



Powermatic—optional in Series 5000-10000 models at extra cost—assures the easiest, safest big-truck operation ever known! It's a Chevrolet "first."

Pick *any* Chevrolet truck . . . and you'll find there's a modern automatic transmission to make your hauling easier, safer, and more profitable!

If your choice is a Series 3000 or 4000 model, there's ***Hydra-Matic.*** This modern automatic transmission not only gives you the ease of no-shift hauling . . . it also *saves you maintenance money* because the hydraulic coupling protects drive-line parts from shock loads. Or, if your job calls for a 5000 through 10000 Series Chevy, there's exclusive ***Powermatic***—the first automatic transmission designed especially for big trucks! Six fully automatic forward speeds and a torque converter virtually eliminate manual gear shifting on hills or in traffic! A revolutionary "retarder" assures safer down-hill hauling, less brake wear and you make better time through traffic because all shifts are "power-on" shifts!

Now *automatic driving*, available throughout the Chevrolet truck line, gives you one more reason to see your Chevy dealer soon! . . . Chevrolet Division of General Motors, Detroit 2, Michigan.

Chevrolet truck manual transmissions are great performers, too!

To give you extra pulling power in the medium- or heavy-duty model you select, Chevrolet trucks provide big, rugged heavy-duty 4-speed Synchro-Mesh transmissions, or brand-new "New Process" 5-speed transmissions!*

**Optional at extra cost in 5000-6000 through 8000 Series models, standard in 9000-10000 Series models.*

CHEVROLET

NEW CHEVROLET TASK·FORCE TRUCKS

Anything less is an old-fashioned truck!

$137 PER DAY
for the RIGHT
MANAGEMENT MAN

WHO WILL SAVE WITH
OSMOSE
TREATED TIES & TIMBERS

Yes, a saving of $137 per day is a big one . . . but entirely possible! If you deep mine 200,000 tons of coal annually, you can save your company $50,000 per year by using OSMOSE TREATED TIES AND TIMBERS. Comparable savings are possible for smaller or larger tonnages. Osmose Ties and Timbers are scientifically treated to resist all types of rot, decay, termites or whatever you prefer to call the wood-consuming action that can annually rob you of a small fortune. Mine timbers are expensive enough but compared to the cost of REPLACEMENT LABOR, today, their cost is trifling.

Osmose Treated Ties and Timbers LAST UP TO FIVE TIMES LONGER saving you both material and labor costs many, many times. No other timbers! No other treating process can surpass Osmose in mine effectiveness or approach Osmose in economy.

That's why the nation's leading coal mining companies substantiate our own natural enthusiasm. For instance The Pocahontas Fuel Company, Inc. says: "Our Company has been using Osmose Timber Treatment, at the various mines, since 1942. We feel that sufficient time has now elapsed to prove the worth of your Treatment, and are pleased to advise that it has been very satisfactory to us."

SEND FOR FREE BOOKLET

Write for fully illustrated booklet, "Force Down Your Operating Costs," that explains in detail all about Osmose Treated Ties and Timbers.

OSMOSE WOOD PRESERVING CO. OF AMERICA, INC.
980 ELLICOTT STREET · BUFFALO 9, NEW YORK
Representatives in: Pittsburgh, Denver, Birmingham, Ala., Charleston, W. Va. and Harlan, Ky.
"Leading Manufacturers of Wood Treating Specialties"

Manufacturers (*Continued*)

managers. National Mine also announced that **William J. Noel,** an assistant to the district sales manager in Beckley, will be transferred to Pittsburgh to assist managers Pattison and Light. **Philip L. Hubbert,** Western Kentucky Div., will succeed Mr. Pattison in Madisonville.

Al Gladding is representing Flexible Steel Lacing Co. in the northeast, succeeding **Les Coleman.** The company manufactures belt fasteners for joining conveyor and transmission belts.

Gardner-Denver has appointed William B. Knoderer sales manager of its Industrial Div. At the same time, the company announced that **Niel Martin Fishback** has been appointed sales manager of the Mining and Contracting Div.

Jeffrey Mfg. has authorized three new agents for rebuilding its mining machinery. The companies are the Galis Electric & Machine Co., Morgantown, W. Va.; the National Electric Coil Co., Bluefield, W. Va. and the National Electric Service Corp., Harlan, Ky.

Herbert G. Dillon has been elected vice president in charge of sales of the McKiernan-Terry Corp., Dover, N. J. Mr. Dillon is associated with the company's Mead-Morrison Div., manufacturer of coal handling towers, bridges, car hauls and rail clamps.

I. F. Shorb is a design engineer for The Daniels Co., Contractors, Inc., Indiana, Pa. Mr. Shorb was with the American Coal Co. before joining Daniels.

James M. Phillips was elected vice president, engineering, Salem-Brosius, Inc., Pittsburgh, Pa. Prior to the appointment Mr. Phillips had been chief engineer of the company.

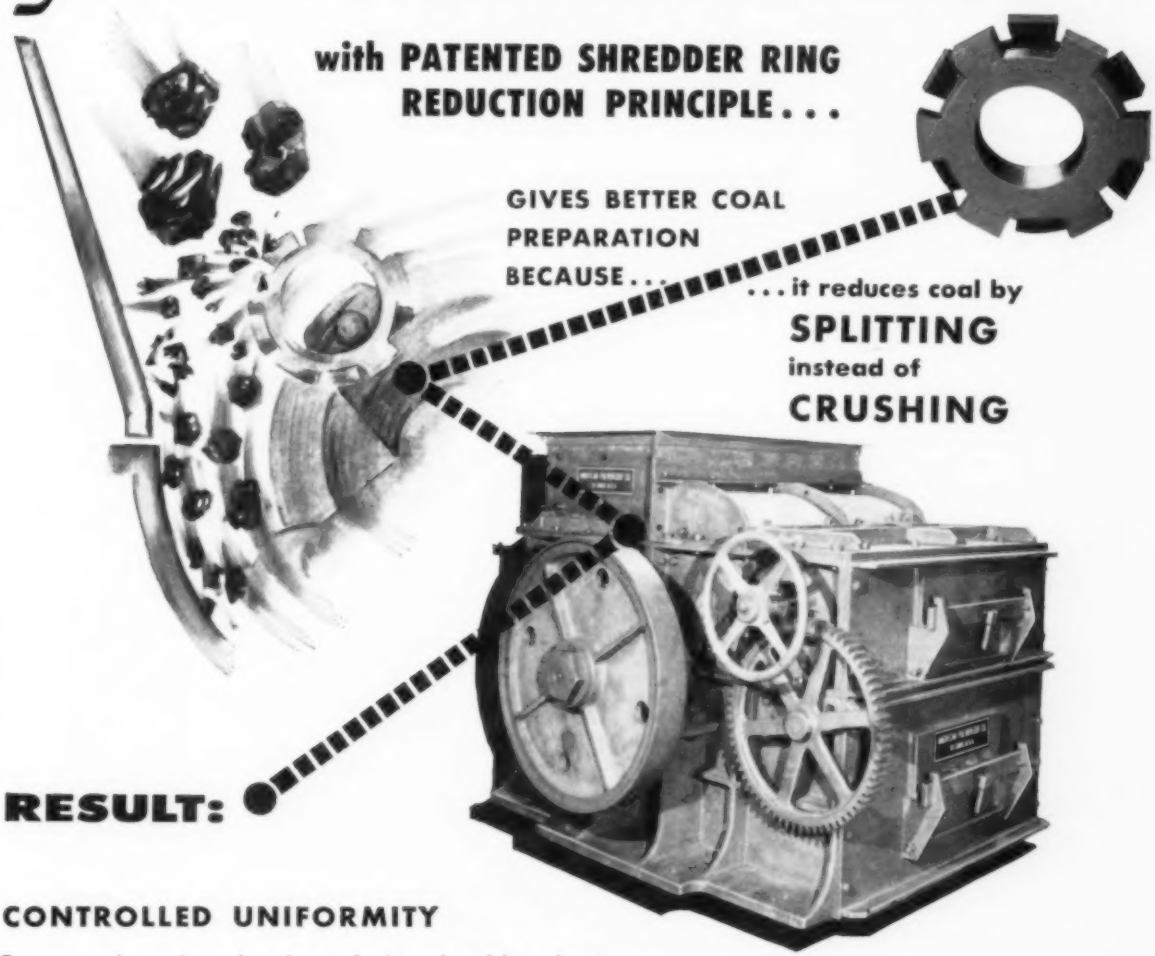
Ohio Brass Co. appointed E. C. Thompson its general factory manager in Mansfield, Ohio. Mr. Thompson was formerly district manager in Dallas, Texas. Succeeding him in Dallas is **T. J. Harris,** formerly district manager in Chicago. **H. A. Blocki** succeeds Mr. Harris in Chicago.

A new Alkaline Div. has been formed in the Engineering Dept., Exide Industrial Div., The Electric Storage Battery Co. William W. Smith, former head of pilot plant activities, has been appointed manager. The division was formed to consolidate alkaline battery programs, in which product research and development have been underway at Exide for several years.

William B. Vance, Jr., has been appointed to represent the American Mine Door Co. in the southern Appalachian coal fields. Mr. Vance will be the company's first representative in the district since the death of **Samuel Hager** in January, 1956.

American Coal Crushers

with PATENTED SHREDDER RING REDUCTION PRINCIPLE...



GIVES BETTER COAL PREPARATION BECAUSE...

...it reduces coal by SPLITTING instead of CRUSHING

RESULT:

CONTROLLED UNIFORMITY

In operation, American's exclusive shredder rings swing outward, by centrifugal force, on their shafts —and reduce coal by the splitting action of 20 cutting edges on each shredder ring.

This action produces less fines, a more uniform product. The rings are reversible for double life.

and for

LOW-COST COAL SAMPLE CRUSHING...

The American Sample Crusher, with its new adjustable sampling hopper, gives 5%, 10%, 15% or 20% of a sample . . . in one operation.

WANT MORE INFORMATION?

There are many *other* design and performance advantages in American Rolling Ring Coal Crushers—features that mean bigger tonnage figures, and lower maintenance (as proved repeatedly by coast-to-coast operations records). WRITE today for Bulletin AC, and get the crushing facts!

American PULVERIZER COMPANY

Originators and Manufacturers of Ring Crushers and Pulverizers

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(Continued from p 90)

Continuous Mining

"We have found that attitudes at all levels of management must be such that employees are inspired to the point of realizing that efficiency in continuous mining is brought about by teamwork and that no machine is more efficient than its crew of operators."

So said Michael Yonko, general manager, Powhatan Mining Co., Powhatan Point, Ohio, in his lead-off paper at the first of two sessions on continuous mining. F. Earle Snarr, vice president, Freeman Coal Mining Co., Chicago, presided.

In relating experience with continuous miners and extensible belts, Mr. Yonko spoke as follows:

"In our effort to get a perfected continuous flow of coal from continuous-mining equipment, a panel belt and two extensible belts were purchased. In August, 1955, this installation was made and the transition from buggies to extensible belts began. This new installation eliminated six surge-car operators and six shuttle-car operators since these two units work on a 3-shift basis. It has also been found that many mechanical and electrical delays that were previously encountered in transporting coal with shuttle cars, as well as many shuttle-car hazards when hauling under steel timbers, have been completely eliminated. As an example of this last effect, the use of extensible belts has completely eliminated the dangers from posts being knocked out by shuttle cars.

"With shuttle-car mining, the air was constantly being disrupted by the cars going through swinging doors to the discharge point; however with the extensible belt, this no longer presents a problem."

Actual operations at Powhatan, using two continuous units, were described by Mr. Yonko, including the following features:

Each miner unit consists of an operator, two timbermen, and a mechanic. One loading-head operator serves both units and one foreman is in charge of the two units. Supply track is laid on either side of the panel belt, thus providing each miner with a separate supply source. One 500,000-cu. mil feeder and one 500,000 return cable is carried up each supply track, allowing for an adequate supply of power for each unit.

Several methods of driving rooms have been explored. Initially rooms were driven on a 60-deg angle to a depth of 260 ft on 25-ft centers. Seven rooms were worked out on each side of the belt and a safety block was left for protection. Despite the fact that reservations were left we continued to be plagued by squeeze conditions. This was a constant worry when it was realized that in working on this angle the men and equipment were placed in a critical area. Sometimes it was found necessary to leave a block of coal five rooms wide to check a squeeze. At this point it was decided to drive all rooms 90 deg so the equipment would, at all times, be adjacent to solid coal and this, in turn, would facilitate moving equipment in case of a squeeze.

At present rooms are driven at a 90-deg angle with two extensible belts. The rooms are driven 640 ft on 32-ft centers without leaving any reservations. Under this plan the purpose is to leave an equal amount of coal in each pillar for protection. This system has eliminated all squeezes and percentage of extraction is somewhat greater.

"Average production per man shift on entry development is 19.1 tons and on pillaring 25.0 tons."

These results of mining with a Colmol at operations of Inland Steel Co., Wheelwright, Ky., were reported by E. H. Roberts, superintendent of underground maintenance, in a paper which was co-authored by G. W. Lockin, production engineer.

Maintenance costs have been about 66c per ton for the continuous machine and adding maintenance costs of the auxiliary machines results in a total maintenance cost that exceeds section labor costs. However, the reduction in labor and supply costs in the continuous section is sufficient to reduce overall section costs up to 6c per ton in favor of continuous mining.

Cutting in the Elkhorn No. 3 seam is hard, Mr. Roberts reported, and it has been found that the Colmol operates to best advantage in pillaring where weight on the coal makes it easier to cut. It is thought that perhaps development will be done by conventional units and the Colmol will be used in pillaring.

"In 1955, our company's continuous-mining production was 22% of our deep mining production."

Noting a number of changes that had been made in 5 yr of using continuous miners, Robert S. Billings, assistant to the production manager, Rochester & Pittsburgh Coal Co., Indiana, Pa., reported confidence in the future growth of the system. Machine components have been modified as experience dictated to alleviate recurring troubles, and better transportation, including the use of an extensible belt, has increased the actual operating time of the miners.

At R. & P. operations, every attempt is made to keep 10,000 cfm of air circulating over a continuous miner. The line curtain is kept in advance of the operator, thus improving both visibility and dust control. Three sprays are used on the miner itself and one behind the line curtain to allay dust in a small area. Rockdusting is done on-shift by hand methods while the miner is operating, and by machine when the miner moves to another place.

Maintenance training for supervisors and men has been an important adjunct to continuous mining, Mr. Billings declared.

"Coal companies operating in low seams have faced a serious competitive problem in recent years."

The newly offered Wilcox miner, a lower continuous-type machine employing the shortwall principle of operation, offers distinct advantages to operators in this situation, according to Robert N. Morris, assistant to the vice president, C. H. Mead Coal Co. division, North American Coal & Dock Co., East Gulf, W. Va. A full description of the application of the Wilcox miner at the Mead properties appears in *Coal Age*, March, 1956.

"It would seem that there is one obvious path to really spectacular gains."

Experience in mining the Redstone seam with a "B"-type Jeffrey Colmol installed in March, 1954, was detailed by Frank Williams, Jr., general manager, Peck's Run Coal Co., Buckhannon, to open the second continuous mining session, with John A. Stachura, general superintendent, Enoco Collieries, Inc., as chairman. Thickness of the coal varies from 54 to 72 in and conditions are variable. Since December, 1954, the machine has mined over 400,000 tons of coal working three shifts a day, 5 or 6 days a week. Crews consist of a Colmol operator, loader operator, two shuttle-car operators and three timbermen, plus a belt maintenance man on the day shift, ventilation man on the evening shift, and a supply man on the third shift. These latter three men also substitute for the operators during lunch time. The first two shifts are production shifts. The third is primarily devoted to section maintenance and supply, including rockdusting, advancing wire and checking and greasing equipment, with any time left over devoted to loading.

An overriding duty of one of the timbermen on each shift is checking roof condition both visually and mechanically at all times when the foreman is absent, particularly when the machine is on the rib line. Consequently, there has not been a single roof-fall injury on a Colmol section. This timberman also advances cable support jacks and helps "style" the miner in negotiating rolls. All men are assigned specific tasks to perform when not working at their regular jobs. For example, the loader operator helps with bit setting, the shuttle-car operators help move up the roof jacks, and so on.

Rooms are driven and mined on one side on the advance, and on the other side on the retreat, including chain pillars. Driving is on 60 deg to form diamond-shaped blocks, which are recovered by splitting crosswise. Rapid recovery eliminates weighting and roof trouble. Small triangular stumps made in splitting are finally shot to permit the roof to cave. No attempt is made to recover them, since leaving them and finally shooting them results in practically complete control of roof action and maximum protection.

Best shifts in the period April-December, 1955, were in the neighborhood of 600 tons; the poorest was 25 tons. The goal of 400 tons was reached on 43½% of the shifts. The major part of the losses

28" FEED

46" FEED

64" FEED

Remove Snap Ring

Remove Chuck

THE LE ROI-CLEVELAND S20 VAC-NU-MATIC STOPER

All models available in either SAV-A-CHANGE or Socket Type Chuck

● The new CLEVELAND S20 VAC-NU-MATIC dust collecting stoper is available in 3 feed lengths to suit any working height down to a 26" seam. *It will produce a 30" hole in a 26" seam without using coupled steel.* The 28" feed weighs 69 lbs. complete. Any model may be used either hand held or jumbo mounted. VAC-NU-MATIC bits are fast and free cutting and eliminate all stuck steels. Dust collection is positive even in wet top. Chucks may be replaced without dismantling the machine, using only a pair of snap-ring pliers. Cuttings are removed at the chuck housing and do not pass through the machine. Write for bulletin RD32 or let us demonstrate in your own mine.

For sales, service, information or demonstration in Pennsylvania and West Virginia contact: Schroeder Brothers — 3116 Penn Ave., Pittsburgh, Pa. or Acme Machinery Co. — Williamson, W. Va. In the Birmingham district contact Equipment Service Co., 617 North 9th St., Birmingham, Ala., or contact us direct from anywhere.

LE ROI Division of Westinghouse Air Brake Co.

Milwaukee 1, Wisconsin

Manufacturers of Cleveland Air Tools

PORTABLE AIR COMPRESSORS

TRACTAIR

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AIR TOOLS

ENGINES

RD-75

are chargeable to sulphur and clay veins, which are "condition" failures in contrast to "system" failures, such as failure of the shuttle cars to carry the coal away. Over and above these failures, "tightness" of the coal, in addition to sulphur, are the major limitations on possible production. Some relief from condition failures may be expected from better bits, in bolting, in better maintenance and in equipment design. This still leaves, in Redstone coal, the sulphur and clay problems. As for "system" limitations, it seems that "one obvious path to really spectacular gains . . . is through the adoption of a mechanized longwall system . . . We are therefore examining this approach to continuous mining."

J. C. Leighton, Carboloy Dept, General Electric Co., Detroit, Mich., in a prepared discussion following Mr. Williams' paper, advocated the further study of mechanized longwalling to secure economic and conservation advantages. What is ultimately desired is more shifts closer to the target tonnage which has been set for the section. Noting that his company is continually studying to improve carbide tools, Mr. Leighton pointed out that chain speed and feed pressures may be modified to get better results. Auger and cham speed may be too fast now and feed may be too light.

In discussion from the floor, C. B. Tillson, general superintendent, Crucible (Pa.) mine, Crucible Steel Co. of America, noted the excellent operating time achieved by machines at Peck's Run, and was informed by Mr. Williams that machines are immediately stopped and repaired as soon as incipient trouble is sensed by the operator.

In reply to a question from session chairman, John A Stachura, general superintendent, Enoco Collieries, Inc., Bruceville, Ind., on relative bit costs for solid work and pillaring, Mr. Williams reported that bit costs in pillaring are very low but in solid work may be 3½c per ton or higher.

"Upper benching was employed to control the ill effects."

Noting that heavy cover and hard sandstone members result in bouncing and bumping at the Sunnyside (Utah) mines, J. L. Taylor, mine engineer, Kaiser Steel Corp., in a discussion of continuous and conventional equipment in high coal, also pointed out that most of the bouncing is of the nonviolent type and can help in continuous mining by bringing the coal down without much cutting. "The good features are few, however," and upper benching was adopted to control the ill effects of violent bouncing and weight.

Average pitch of the coal at Sunnyside is 10% and development is based on driving entries on the strike and working rooms up the pitch, mining the pillars as soon as rooms are completed. Two rooms provide a territory for continuous units and three for conventional units.

If seam thickness is less than 10 ft, the full height is taken. Over 10 ft, the coal is removed in two lifts. The first step is to drive the heading or room 8 to 9 ft high in the upper part of the seam, bolting the top. Next, the pillars are mined by pocketing across, after which the miner or loader ramps down and takes out the bottom coal.

Better roof and rib control are the major advantages of upper benching, with a second the fact that rock is securely bolted as the entries are advanced in development, saving trouble and expense in the future. The opportunity to secure the top before removing the bottom coal in rooms is advantageous in eliminating bolting or timbering in extreme-height places.

"Low voltage equals low coal production; high average voltage, desired coal production."

Results of 14 electrical load tests to determine the power requirements of various types of continuous miners were summarized by J. O. Cree, West Virginia Engineering Co., Charleston, W. Va. One finding was that dull bits definitely cut production while jacking up power requirements. For example, one test with dull bits resulted in a face advance of 20 ft in 50 min with a demand of 82.4 kw and a usage of 32.47 kwhr. With sharp bits, the machine advanced 30 ft in 54 min, with demand of 69 kw and consumption of 31.33 kwhr.

For maximum tonnage, motors should operate a rated speed, meaning that DC voltage should be 250 at the nips. To provide 800 amp at 250 V with a 50-V loss at 3,250 ft, equivalent copper conductor should be 1,050,000 cir mil, costing, at $4 a foot, $26,000. At 4,000 ft, size would be 1,440,000 and the cost would be $5.13 a foot or $41,000 total. Considering moving costs and the relative costs of AC and DC cable, the most economical move is 3,250 ft. For a 440-V AC system, with three 500,000-cir mil conductors, the economical moving distance is about 3,000 ft.

Conclusions presented by Mr. Cree were:

"A delivery of 250 V at the nips for the DC units should be maintained, and with transformers producing 480 V the system should not be extended beyond 3,000 ft.

"The peak and average currents indicate 150-kw conversion or transformer capacity for the miners, with 200 kw as the minimum for serving the complete section.

"The power use, or kilowatt-hours per ton, on the basis of these tests, would vary from 0.75 to 1.00 per ton for the unit, with the cutting characteristics of the coal seam the determining factor. For the full section, power use can be expected to vary from 1.00 to 1.25 kwhr per ton."

C. E. McWhorter, mining engineer, Goodman Mfg. Co., Chicago, Ill., in a prepared discussion of Mr. Cree's paper, pointed out that power consumption is from 0.75 to 1 kw per ton, which figures out to a power cost of just a few cents per ton. Even doubling efficiency here would not return large savings. But bit costs are another matter, providing an area in which an appreciable savings may result from diligent study. Sharp bits can be kept on a mining machine if the operator is trained to seize opportunities to make changes.

On the use of AC power, Mr. McWhorter pointed out that if AC voltage is not kept up to proper levels the motors will stall and this can be a definite disadvantage. Furthermore, AC equipment is lower in cost.

Coal Preparation

"Plant bleed has consistently contained less than 1% solids."

The fine-coal plant at Island Creek's No. 6 Mine has been in operation 6 mo. The usual "bug" period of a new plant has made itself known. However, everything has been worked out satisfactorily and the plant is doing all it was designed to do. Matthew Turkovich, director of preparation, Island Creek Coal Co. declared, discussing water clarification to prevent stream pollution. He opened the Tuesday morning coal preparation session, of which W. W. Everett, vice president, Glen Alden Corp., was chairman.

The fine-coal plant at Bradshaw No. 6 was designed and constructed to operate with a two-stage cyclone system followed by filtration to recover the maximum quantity of fine coal as a saleable product. At the same time it permits recirculation of the water. Refuse from the cleaning tables is drained of its surplus water containing essentially minus-28M solids. The water is collected and pumped through cyclones and the overflow is sent to a small settling pond. This plant bleed has consistently contained less than 1% solids. Under normal operation, it has been less than ½% solids.

Ash in the clean coal is within expectation, averaging 4.75%, Mr. Turkovich noted. Float material in the table rejects has been within the allowable 10%. The quantity of waste water or bleed from the plant of about 50 gpm is far below the expected 210 gpm rate. The same is true of the 0.45 to 0.82% solids in the bleed. The waste water is all the more gratifying when the softness of Pocahontas coal is considered.

The pond into which the bleed flows is small because of existing natural conditions. However, its life is extended by the fact that such a small amount of solids enter it. Its overflow enters the Dry Fork Branch of the Tug River and contains suspended solids amounting to 0.045 to 0.082% of the discharge. This is expected to meet the State Water Commission requirements. When the pond ceases to be effective, another small one will be located within the plant area.

Commenting on Mr. Turkovich's paper, John Griffen, coal and coke consultant, Pittsburgh, said that cyclones, considered primarily as classifiers, can accomplish results not possible by other water-clarification equipment.

He warned, however, that cyclones should be installed so as not to interfere with the proper functioning of other plant units. Lack of appreciation of the limits of cyclone equipment and of its effects on other plant units frequently causes failures in water clarification systems.

Mr. Griffen added in later comment that the main problem in water clarification was in removing the clays not the fine coal. In removing clays, flocculating agents often can be helpful, the coal and coke consultant said.

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Three sizes accommodate 4/0 to 1,600,000 cm feeder cable, all three hold any size trolley wire.

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"The preparation plant has been operating since September, 1955, producing a uniform metallurgical and steam coal through the process of washing, drying and sizing."

The need for a coal preparation modernization program at the Joanne Mine of the Joanne Coal Co., Rachel, W. Va., was foreseen in 1954 due to an increasing demand for a better marketable coal, according to C. C. Cornelius, vice president —operations, Baton Coal Co., Pittsburgh, Pa. To meet this challenge, a very complete study had to be made of the coal within the Pittsburgh seam to determine how much the ash and sulphur content of the raw coal could be lowered. The results of this test work materialized into a 350-tph plant designed for producing a clean coal for both the industrial and utility markets. The preparation plant has been operating since September, 1955, producing a uniform metallurgical and steam coal through the process of washing, drying and sizing.

Plant equipment and facilties features a four-compartment 2,000-ton concrete storage bin which permits (1) storage without contamination of the mine's low-, medium- and high-sulphur coal and (2) continuous flow of coal to the preparation plant. The raw-coal collecting belt conveyor under the storage bin transfers the coal to an elevating flight conveyor discharging into the feed sluice of the Link-Belt parallel-bed air-pulsated wash box. Other equipment includes a jig, two horizontal vibrating screens, belt conveyors for transporting the cleaned coal to the screening tipple, a drag tank to make a 100M separation, two seven-way distributors, 14 Deister coal-washing tables and three Reineveld centrifugal dryers.

For successful cleaning operation and maximum recovery of fine coal, where coal recovery is performed by jigs and tables, adequate water clarification is necessary to maintain a consistently marketable product. In planning the Joanne plant, it was necessary that the fine-coal circuit and water-clarification system provide:

1. Maximum recovery of merchantable coal.
2. Controlled solids content for the circulating water.
3. Method of conserving the maximum amount of water.
4. Means of satisfying requirements of stream-pollution legislation.

The final fine-coal recovery and water-clarification process in the Joanne plant centers around an 80-ft thickener and disc vacuum filter. (Eventually, a 35-ft filter will be used to avoid the necessity of fluming water from refuse dewatering screens to a pond.)

A separate water circuit for the water from the refuse dewatering screens is maintained to prevent contamination of the 80-ft coal thickener feed. This also permits the resulting product from the vacuum filter to be acceptable as clean coal at all times.

Typical performance data taken during actual operation of the thickener and filter show that the thickener influent is less than 10% solids. Coal thickener performance is usually evaluated with respect to plant circulating water. Some coal cleaning plant operators think that best jig performance is obtained when the circulating water does not exceed 10% solids. The Joanne plant is operating with 4% solids in the circulating water, made possible by a thickener effluent containing less than 0.5% solids. The vacuum filter filtrate averages less than 1% solids and the thickener underflow averages from 40 to 45% solids.

Analysis of the minus 325M thickener effluent solids shows a high ash content of 46.73%. This indicates to a degree the amount of clay within the plant water circuit. Although this percentage appears to be high, it represents a very minute quantity within the thickener effluent.

The thickener underflow analysis shows that about 9% plus 28M material must be filtered. This percentage is within the range for optimum vacuum filter performance.

"At present, the rate per ton-mile for rail haulage is about twice that for barge hauling."

The 200% increase in coal for electric power during the last 10 yr (from 75 million tons in 1945 to 141 million tons in 1955) brought with it the need for building more generating facilities at many different locations. Where a navigable stream has been available, the railroads have been unable to compete with barge transportation of coal, observed D. H. McFadden, assistant chief engineer, Ayrshire Collieries Corp., Indianapolis, Ind. At present, the rate per ton-mile for rail haulage is about twice that for barge haulage. There is no prospect that the differential will decrease—to the contrary, probably.

Low-cost river transportation initiated the planning of the Yankeetown Dock Corp. barge-loading facility near Newburgh, Ind., on the Ohio River and that of the Gibralter Coal Corp., near Central City, Ky., on the Green River. Both of these facilities are jointly owned by the Peabody and Ayrshire groups and were constructed to load coal for delivery by barge to the Ohio Valley Electric Corp.'s generating station near Madison, Ind.

Barges require a different loading system than the familiar railroad-type layout, so a study was made of the four principal methods used: stationary chute, elevating boom, floating barge and tripper conveyor. The elevating boom system was used at Yankeetown; the tripper-conveyor at Gibralter.

Many things must be studied before selecting the type of barge-loading system to be used. Among the most important considerations are: typography of the site, characteristics of the stream or water, harbor storage capacity for empty and loaded barges, the desired loading rate for the facility, and the characteristics of the coal to be loaded.

Following up Mr. McFadden's talk, John Donan, consulting engineer, Madisonville, Ky., commented on his experience in the design and engineering of barge-loading systems.

"The presence in the refuse of much near-gravity material made it important that recovery be accomplished through units which will operate at high efficiency with difficult feed."

How savings of $2,176 per day, or approximately $544,000 a year, were achieved by salvaging coal from jig rejects was detailed by H. L. Beattie, vice president, Elk River Coal & Lumber Co., Widen, W. Va., to open the second preparation session. James C. Gray, vice president, Coal Div., U. S. Steel Corp., Pittsburgh, presided. Salvage was accomplished, Mr. Beattie noted, by installing a Daniels DMS separator. Major reasons for the choice of this unit were ability to respond quickly to a fluctuating feed varying from, say, 30% float to all sink, adequate refuse handling capacity, and high separating efficiency.

Feed to the unit is 6x⅜. With a mine output of 5,600 tons a day, recovery is 510 tons a day with an ash content of 6.9%. Cost of the addition was less than $100,000, and daily charges are: magnetite, $69; amortization, $40; welfare, $204; royalty, $51; and labor, $61. Savings are $2,550 (510 tons at $5 a ton) in coal recovered and $51 in refuse disposal. Deducting charges, the net is $2,176 per day. Other benefits include better results in regular jig washing and an increase in plant capacity from 3,500 to a maximum of 6,000 tons per day. The salvage plant also contributed substantially to an increase in tons per man from 5.6 to 8.2 per day.

"The realization from the recovered coal is approximately $1,000 per day, exclusive of the savings effected by eliminating the cost of hauling this material to the refuse pile."

Thus L. I. Cothern, director of engineering, Jewell Ridge Coal Corp., summarized the results of treating reject from the original 2x¼ washer at the Tilford (Ky.) plant, which had been overloaded by an increase in mine output. The recovery unit installed was a Wemco dense-media drum. One criterion in the selection was ability to perform efficiently with a variable feed.

Original tests showed that 56% of the primary washer reject could be recovered with an ash of 10.35%. Since installation, the unit has been operated at a gravity of 1.40 with a yield of 51.85% at an ash of 4.93%, meaning 4 to 5 cars of coal per day from the 2x¼ primary washer refuse. Cost of the complete recovery plant was approximately $47,000.

"Careful studies were made of various preparation processes, the primary consideration being the ultimate coke quality."

Designed to process some 17,000 tons of coal per day from the corporation's two mines at Lynch, the new Corbin (Ky.) plant of the U. S. Steel Corp. pro-

Wire Rope at Work—Running uphill and downdale, a long aerial tramway serves the properties of Northwest Magnesite Co., near Chewelah, Wash. Built by Riblet Tramway Co., this 13½-mile overhead conveyor hauls magnesite to the concentrating mill, and from the mill to the reduction plant. While loaded buckets travel one way, the empties run alongside in the opposite direction.

The system is built in two sections, or legs. Bethlehem traction rope, nearly 27 miles of it, hauls the buckets on both sections. Approximately 87,000 ft of this traction rope is 1-in. 6 x 19; the remainder is ¾-in. 6 x 7. The two lengths of rope have been in service since early 1953, and they are still going strong.

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vides material for the high-volatile portion of the coal blended for use in the by-product ovens at Northern Lake-Front plants, said Paul L. Richards, manager, coal preparation, Coal Div., and Andrew E. Hamlet, superintendent of the Corbin plant. Run-of-mine is crushed to 8x0 at the mines and then is shipped by rail to Corbine, where the processing facilities include the following:

Four 600-ton storage bins, from which coal is fed to the plant at a design rate of 600 tph.

Chance-cone cleaning equipment for 4x¼, including continuous-desilting facilities based on the first radial screen to be installed in the United States.

Dual bowl desiltors for the first step in processing ¼x0, overflowing minus 100M.

Two batteries of nine coal-washing tables.

Four solid-bowl centrifugal filters, plus a spare.

Three thermal driers handling the filter product plus the desired quantity of 1¼x¼ coarse coal.

"The raw coal from the B, C and High Splint seams averages 9.5%. However, daily increment samples show variations from 5 to 30% in ash content. With low ash and uniformity of product of prime importance in blast-furnace performance, the plant product has met the guaranteed average analysis of 3.5% ash. It also has met uniformity specifications requiring that at least 67% of the samples in any one month shall be within a range of plus or minus 5% of the guaranteed average value.

"With the bowl-desiltor removing in excess of 90% of the minus 200M slimes from the table feed, the centrifugal solid-bowl filters have been able to maintain a surface moisture in the cake of 6.5%. Since the designed plant capacity was based on the capacity of the thermal driers, this performance has permitted an increase of 25% in the plant feed. In addition, the shipped product analyzes 4.0% total moisture instead of the guaranteed average value of 4.5%. With a raw coal averaging in excess of 9.0% ash, the plant has consistently maintained a yield of approximately 90%."

"Increased demand by public utility power plants indicated the need for more efficient and flexible washing equipment and increased coal preparation capacity."

In addition to the preceding, another factor in modernizing the Buckheart plant was entrance into a field of coal varying in inherent quality, said Andrew J. Gaber, preparation engineer, United Electric Coal Cos., Canton, Ill. Modernization objectives were:

1. Increasing raw-coal capacity from 600 to 1,000 tph.
2. Elimination of hand picking of larger sizes.
3. Utilization of dense-medium washing for product uniformity and maximum recovery.
4. Greater recovery of minus 5/16 coal.
5. Connection to the existing structure with a minimum of time available.

Facilities included in the modernization program included a Bradford breaker for rough cleaning and reduction of the raw feed to 6x0; four Neldco dense-medium processors, one each for 6x3 and 3x1¼ and two for recleaning sink from the 3x¼ processor after crushing to 1¼ in and removal of minus 5/16; a launder plant for 5/16x0 supplemented by a 6-ft Hydrotator; and three centrifugal driers. The Hydrotator was installed to skim off a low-ash float coal from the rougher refuse product of one launder, and has proved its worth when feed rates drop down by preventing disruption of launder beds. Another benefit is an additional recovery of 5/16x0 aggregating 100 tons per day.

Industrial Engineering

"Except for very unusual periods, no company can survive unless it can produce coal in the most efficient manner."

Probably at no other time in the history of the coal industry have the stakes been so high as they are today. Except for very unusual periods no company can survive unless it can produce coal in the most efficient manner. And industrial engineering is management's tool for finding the best ways to achieve maximum production efficiency. Thus Herbert E. Jones, Jr., executive vice president, Amherst Coal Co., Lundale, W. Va., presented an "executive viewpoint" at the Tuesday afternoon industrial engineering session, under the chairmanship of J. Allan Brookes, general manager, Mather collieries, Pickands Mather & Co., Mather, Pa.

Since the inception of Amherst Coal's industrial engineering program in September, 1952, the company's labor cost has been reduced 22% and the supply cost 26%. This progress has been achieved by close analysis of each individual operation of the company's nine mines, which have a total output of 15,000 tpd and which range in individual size from 3,000 tons to less than 1,000 tons. The great variations in seam and mining conditions in these mines made it extremely important to try to adapt to more or less standard method of mining through industrial engineering analysis.

"After several discussions between ourselves and an outside industrial engineering firm, it was decided to establish a supervisory incentive program and to develop production standards. We felt that the incentive program should increase the 'take home' pay of our supervisors, and, at the same time, decrease our costs. We felt that the standards program would set up the proper goals and controls for the incentive program." Results on both levels have been highly gratifying.

To keep the program in motion, the company set up an Industrial Engineering Dept. with three industrial engineers. One is a methods engineer, one is a cost control engineer and the third is a production engineer. In addition, mine foremen and engineers spend 3 mo in the department as trainees.

"Certain pitfalls must be avoided," Mr. Jones cautioned. The mere conception of a cost-cutting or production-increasing idea is not enough. This idea must be thoroughly evaluated and then sold to the production personnel—or else the idea will fall flat.

"Industrial engineering is all of the machinery for planning and control."

Industrial engineering, applied to coal mining, is based on the premise that all cost can be controlled, stated Ralph B. Dean, administrative assistant, The Lorado Coal Mining Co., Columbus, Ohio. He added that the only way to control the total cost is to control each element of expense, and these elements are to be controlled at their point of origin. Cost control is accomplished by determining standards to measure performance, assigning cost responsibility, delegating authority commensurate with responsibility, and providing financial incentive to get work performed efficiently and profitably.

This is the philosophy of the management program at Lorado that was set up by T. M. Barry, head of Theodore Barry & Associates, Los Angeles, Calif. From the effective date of the program, October, 1951, to June, 1954, direct cost of mining coal had been reduced by about 25% and face tons per man day (without elaborate equipment changes) had increased by 40%. Further reduction of cost and improvement in face tonnage have materialized since June, 1954, by confirmed refinement and application of our management program.

Lorado's operating viewpoint on industrial engineering is more than just a means of setting standards and evaluating performances. It is all of the machinery for planning and control. In effect, management has developed an integrated cost control program.

Frequently a company will be unable to measure or segregate the amount of improvement due directly to its industrial engineer, John W. Straton, director of industrial engineering, Princess Elkhorn Coal Co., David, Ky., observed in opening the discussion. In other cases, it will not be possible to point to annual savings from a single project sufficient to cover the cost of the industrial engineering department for several years. However, if a company selects the right type of individual, places him in the organization where he can do the most good, and uses his services properly, many dollars will return for each dollar spent.

Mr. Straton outlined procedures and techniques employed by Princess Elkhorn Coal Co., in setting up and implementing an effective industrial engineering program. The program, he said, has brought these advances since 1951: tons per payroll man have increased 44%; tons per section man have risen 72%; and tons per loading machine shift have increased 40%. Despite numerous wage increases, labor cost for 1955 was 21% below 1951,

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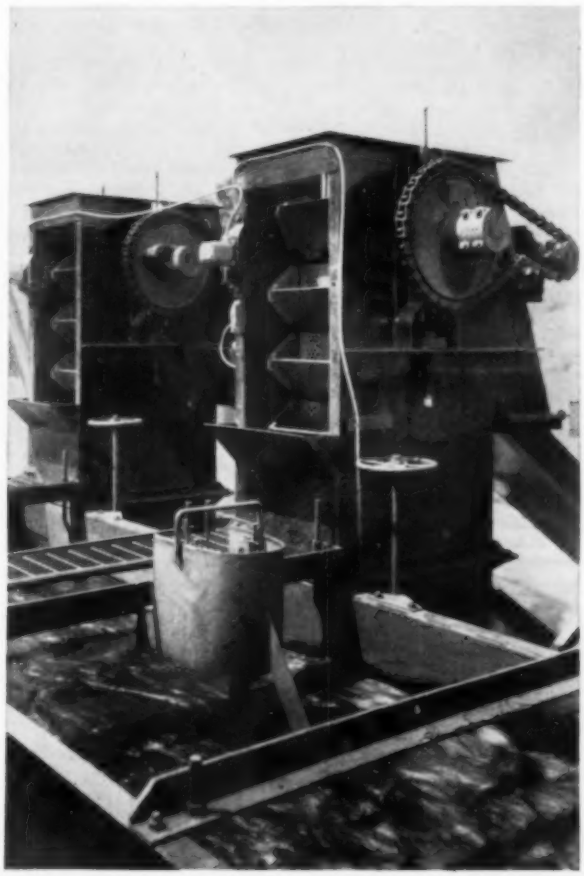

Typical Jeffrey dense-medium jig in a coal preparation plant.

Jeffrey dense-medium plants are handling some of the world's toughest separation jobs, recovering coal of specified quality usually above 99.5%. A Jeffrey jig effectively separates coarse and fine sizes simultaneously, cleaning 8-inch to 100-mesh coal in the same jig. No necessity for prescreening jig feed.

The float-and-sink process employed by Jeffrey uses bone from raw coal itself as the medium, so there's no expense for that. The jig recovers the medium and maintains it at the proper density. No auxiliary equipment is required, except a conveyor to return the medium. Only enough water is needed to transport the coal, so fine coals are recovered better and a smaller, less costly settling system suffices.

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and there has been a 5% reduction in supply cost. Also, despite a decrease in average height from 37 in to 35 in, the only major equipment changes have been the introduction of the rubber-tired cutting machine and the use of a third shuttle car on some sections.

Loading machines and continuous miners—through greatly accelerating production—have created performance problems and the need for some analytical tool to analyze same. Industrial engineering is that tool, noted Walter Weaver, assistant mining industrial engineer, Vesta-Shannopin Div., Jones & Laughlin Steel Corp., California, Pa. Industrial engineering is no cure-all for every problem but is the best available means for obtaining highest efficiency and greatest production.

How management uses industrial engineering will vary from one company to another and from one location to another. But the basic effort is the same: to develop the proper equipment and methods so that each man, from the face all the way up the production line, can do the best job. The basic goal is also the same: a better product at lower cost with maximum output and maximum safety.

"A good industrial engineering procedure on which to start would be work simplification."

Recognizing that industrial engineering is a big and complex subject, John H. Gooch, management consultant, Ingle Coal Co., Elberfeld, Ind., suggested the following as starting points in studying application of this management tool to the coal mining industry and individual company operations:

1. Define the industry's problems today as accurately as possible and write down several of them.

2. Paint a picture of three or more real goals toward which the coal industry should be striving today.

3. Study industrial engineering procedures as presented in available texts and magazines and by authorities at technical meetings.

4. Learn what other industries have been doing with industrial engineering.

5. Conduct some experiments with industrial-engineering procedures on specific problems in some mines.

A good industrial-engineering procedure on which to start would be work simplification. Select some operation or some process, learn every detail about how it is done, and then question many of these details using a special set of questions mainly based on: who, what, where, when, why and how. As an experiment, select one of the simplest operations, such as taping of an electrical connection with asbestos and rubber, removing a cover plate from a machine, repairing a cable, or, for a bigger job, laying a switch.

Roof Support

"A high percentage of recovery is a must."

"It has been our experience that the highest percentage of recovery in the Pocahontas coal field is best obtained by the open-end method of pillar recovery." However, said H. A. Cassell, division superintendent, Pocahontas Fuel Co., Pocahontas, Va., in opening the session on roof support, with P. L. Shields, president, Spring Canyon Coal Co., Salt Lake City, presiding, the advent of mechanical loading created a number of problems, which had to be solved by trial and error to reach the present system in use at Itmann mine. Mr. Cassell's paper was presented by J. W. Pero, production manager for Pocahontas Fuel.

Fourteen Joy loader units and one Lee-Norse miner unit, all served by shuttle cars, are in service at Itmann in coal averaging 55 in in the 500-acre area used to illustrate the working of the method. Maximum cover is 900 ft, and the immediate top is 2 ft of slate followed by 4 ft of conglomerate, ½ in of coal rider and 75 ft of sandstone. Panel entries are protected by ¾- and later ⅝-in roof bolts on 4-ft centers, with a row along the rib across the place where any crosscut was to be driven before the first cut is made. Where necessary, the bolts are supplemented by 3x6x30-in cap boards. Panels are arranged for positive air movement from the active workings toward the gob, and from the gob directly into the return and away from any electrical equipment, as well as to minimize dislodging of coal from the pillar face by weight.

In pillar extraction by the open-end method, support is provided by at least four rows of posts on 2-ft centers along the open side as soon as space is available. Each two rows is set under common half headers, which tend to bind them together and prevent dislodgment. Safety timbers in the face area comprise the remainder of the support, unless the top is abnormally bad, or when the final cut is being taken or a "push out" is being conducted. Usually, a pillar is removed by two consecutive lifts from the entry, followed by final extraction from the crosscuts. This reduces the "hazardous" final steps to three, viz., the last cut in two pillar lifts and one "push out." In continuous mining, a flat pillar line is maintained by a combination of splitting and open-ending.

Advantages of open-ending were summarized by Mr. Cassell as follows:

1. Better ventilation along pillar faces.

2. Easier sweeping of the edges of the gob and less likelihood of methane accumulations near the working faces.

3. Sprags of coal are not created and left behind to prevent clean falls.

4. Elimination of the need for shooting sprags and fenders to permit free falls.

5. Reduction, by practically complete coal extraction, of the possibility of weight riding over from the gob and resulting in squeezes and bumping.

6. Maximum recovery.

In formal discussion of Mr. Cassell's paper, Paul Gill, chief mining engineer, Clearfield Bituminous Coal Corp., Indiana, Pa., described methods in use in 34- to 42-in Upper and Lower Freeport and Lower Kittanning seams in central Pennsylvania. Pillar recovery usually involves the pocket-and-fender method with fenders being partially recovered. Open-end work is done only with the approval of the state mine inspector. Using a half-advance half-retreat system, recovery in pillar coal is from 85 to 96% and overall recovery averages about 92%.

Roof Bolting

"The art of roof-bolting has been accepted by the coal industry with greater rapidity than any other mining change since the inception of mechanization."

Reviewing roof-bolting equipment, Robert Fletcher, vice president, J. H. Fletcher & Co., Huntington, W. Va., noted that "many improvements have been made in pneumatic and rotary equipment in the last 6 yr. Greater stroke and more power have been built into stopers, with increased capacity and flexibility through multiple-arm mounts. Rotary drilling has benefitted from improved carbide, bits and augers, and a better understanding of the relation of feed pressure to speed of rotation in drilling the denser rocks. With both types, manufacturers are striving for greater capacity, minimum labor and automation. Many designs are now influenced by the continuous mining machine with which the bolter must often work."

The type of roof strata, Mr. Fletcher also noted, "is becoming less and less a determining factor in choosing between pneumatic and rotary drilling equipment. The latest stopers, with movable mounts, are increasing capacity and reducing labor over former air methods. Rotary drills have improved carbides, more powerful machines and automation to better their effectiveness in sandstone. But of most importance to all equipment is the increasing awareness of operating personnel that drilling must be systematized.

"Many mines are appointing one individual to be responsible for bolting. He first is the focal point for all manufacturer representatives, and can be posted by them on all the latest developments in bolting, such as, bolts, plates or shells, bolting patterns, tools or machinery. He also checks the crews to see that the machines and tools are properly used.

"Finally, he can establish programs, such as, a bit record. As one example, by following this record, it is possible to determine whether one operator is drilling correctly, if the machine is in adjustment, or if the right size and number of tools are being furnished. It is of help to the foreman in gaining the most from his men, and catches costs at the source."

"The greatest single contribution to a solution of this long-standing problem undoubtedly has been the development of roof-bolting as a means of roof support." *(Continued on p 168)*

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Leaning front wheels with heavy-duty axle, for better control in close quarter-work.

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Experimentation on the use of Akins Spiral Classifiers in making a sink and float separation was first started in 1938. Continuous research, on pilot plant and commercial scales, resulted in development of the Akins Separator . . . a modification of the classifier which retains all of the important mechanical features of the Akins. In 1944 the first 78" Akins Separator was placed in successful operation by one of the large iron mining companies, followed in 1948 by a unit of the same size in a large West Virginia coal cleaning plant.

1956 . . .

This Akins Separator is making a 3-product separation, requiring only one media circuit. The Akins Separator, permitting extraction and blending of middlings with either float or sink, makes it possible to improve both grade and recovery and produce two types of coal from the same seam . . . one a high grade for domestic and industrial uses and one a high-ash product for large steam plants.

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(Continued from p 166)

Noting that his company was among the first to experiment with roof bolts, M. E. Prunty, safety director, Consolidation Coal Co. (Ky.), Div. Pittsburgh Consolidation Coal Co., Jenkins, Ky., pointed out that it was motivated by a generally weak top. The first bolts were of the slotted type. Disadvantages led to experiments with the expansion-shell type, which is now stanard in diameters of ⅝ to ¾ in and lengths of 36 to 72 in, with 6-in square plates ¼ in thick. The pattern is based on 4-ft centers at right angles and not over 4½ ft parallel with the centerline. If the rib is over 4 ft from the nearest bolt, additional ones must be set. "Since bolts are expensive, proper cutting and drilling of the coal is emphasized." Rotary wet drilling is the rule, though dry operation with dust collectors is particularly advantageous under some conditions.

Advantages of roof-bolting in addition to direct reduction of roof-fall accidents, were summarized by Mr. Prunty as follows:

Fewer accidents from handling bulky timber and other supplies, and from movement of equipment in restricted areas. The reduction in these directions since roof-bolting started 6 yr ago has been approximately 80%.

Lower ventilating cost by eliminating timber and roof-fall obstructions.

Higher production through freer equipment movement, fewer falls to contend with and less material to be handled. These factors have been largely responsible for an increase of approximately 70% in production efficiency in the past 6 yr.

"While roof-bolting has played its part in the downward trend of roof-fall injury-frequency rates, its influence on the overall roof-fall injury picture in 1955 is disappointing when one considers that the use of bolts in coal mines increased one-third in 1955."

Pointing out that 14 fatal accidents were reported in 1955 where bolting was the accepted means of support, and that all were within the 25-ft face zone where three-fourths of all roof-fall injuries occur, Edward Thomas, mining engineer in charge of roof control, USBM, also noted that 9 of the 14 occurred in the unsupported space between the face and the last row of bolts.

To some extent, bolting reduces the exposure to unsupported roof in this face zone by reducing the operations performed in the zone, reducing the average overhang, and reinforcing the rock span between the last bolts and the face. Safety posts or jacks, nevertheless, are as necessary as ever.

If further reductions in roof-fall injuries are to be achieved the 25-ft face zone is the place to work. Steps to that end include reducing the span, using safety posts and jacks, and reducing the

Open pit operators: here's what a Michigan Tractor Shovel can do

1 Rips and removes slate.

With a standard scarifier attachment on the bucket, a 2¼-yd. Michigan Tractor Shovel rips out slate at a West Virginia open strip pit. The teeth rip into the bone on the reverse pass; on the forward pass, the teeth retract automatically and the bucket removes the ripped material.

2 Digs "out of the solid."

On a demonstration at Clearfield, Pa., a 133-hp Michigan 175A puts on a real show of power and traction as it digs direct from the vein. In the event of a loading shovel failure, the 2¼-yd. Michigan will do a completely adequate job of loading out shot coal.

3 Cleans-up.

The Michigan's low-level bucket roll-back—40 degrees—eliminates hand loading of spillage. This Tractor Shovel is also used to build and maintain haul roads around the operation.

4 Blends and loads.

The tipple is 6 miles from this West Virginia pit—a short jaunt for the 27 mph Michigan. Blending and loading from stockpiles in a 300 yd. radius, the Michigan averages 1200 tons in a normal 7½ hour day.

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exposures resulting from unnecessary roof testing. Others include preparing coal so that men need not go to the face during loading and using bolting equipment that also provides temporary support.

"Costs reduced and production increased."

Using Joy and CP equipment provided with MSA dust collectors, roof at the Green Valley mine is supported by ⅝-in roof bolts 4 ft long with expansion shells, supplemented by 1x6x20-in wood headers in rooms and panel entries, and 6-in channels 10 ft long in main entries, reported William J. McCullough, safety director, Snow Hill Coal Corp., Terre Haute, Ind. Not only has bolting been advantageous in reducing accidents and operating costs, said Mr. McCullough, it has "been the difference between operating and failure for this mine."

Roof-bolting was adopted 100% in 1953, when there were two compensable accidents, compared to 13 in 1950, 19 in 1951, and 16 in 1952. The record in 1954 was one, and in 1955, two.

Relative costs are as follows:

Timbering, 1951-52—labor, $0.2790 per ton; supplies, $0.2912; compensation, $0.1102; total, $0.6804.

Bolting, 1954-55—labor, $0.1549 per ton; supplies, $0.2915; compensation, $0.0676; total, $0.5140.

Average production in 1951-52 was

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The ABP Code of Ethics

The publisher of a businesspaper should dedicate his best efforts to the cause of business and social service, and to this end each member of the Associated Business Publications pledges himself:

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4. To encourage all constructive efforts to improve the standards and quality of advertising.
5. To avoid unfair competition.
6. To determine what is the highest and largest function of the field which he serves, and then to strive in every legitimate way to promote that function.

Coal Age

A McGraw-Hill Publication, 330 West 42nd Street, New York 36, N.Y.

American Mining Congress . . . Cincinnati Meeting

2,687 tons per day with 296 men; in 1954-55, 4,354 tons with 289 men.

Bolts are recovered by two-man crews using a 10-prop set of timber, a long-handled wrench to break the bolt loose, and a speed wrench to remove. Recovery runs about 45% and two men will average 170 bolts per shift, including reassembly with a new PALNUT and expansion shell, oiling the threads, and stacking the bolts and header boards where the bolting crews can pick them up. Some bolts have been used more than five times.

Preventing Belt Fires

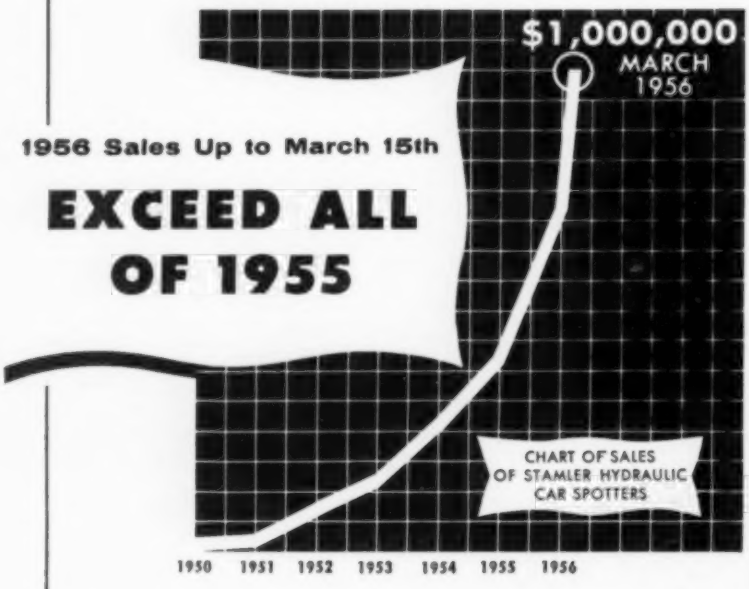
"Fire resistance is a very desirable characteristic in underground belting. It has now become a necessity in some places. It is, unfortunately, a property that has a price tag attached."

A simple answer to the question "What is a fire-resistant belt?" is: One that meets the requirements of USBM Schedule 28 approved Nov. 9, 1955, said J. L. Thornton, manager, Coal Div., Belting Sales Dept., Goodyear Tire & Rubber Co., in opening a discussion of preventing belt fires at the haulage and power session, with V. D. Picklesimer, vice president, South-East Coal Co., Seco, Ky., presiding. Discussing manufacturing methods, costs and materials for the two major types—neoprene and PVC—Mr. Thornton concluded that neoprene is the best bet. In addition, the conveyor should be equipped with protective devices, and particularly a centrifugal switch for slippage control.

"When belt conveyors are equipped with full magnetic motor starters, sequencing centrifugal switches, centrifugal switches and timers for belt protection and safety belt control, they become a very effective and safe means of transporting coal."

Controlled sequence starting by remote control cables or centrifugal switches at the tail sections of the outby conveyors in series with the push buttons for the inby belts are one form of protection for belt conveyors, declared S. H. Nash, electrical engineer, Ensign Electric & Mfg. Co., Huntington, W. Va. Belt slippage is another major hazard, which can be effectively guarded against by a centrifugal switch with a timing relay. Another problem is starting or stopping the conveyor at any point along its length, especially when men are carried. An effective device is two bare wires with 3-v dry-cell power strung

There MUST be a Reason!



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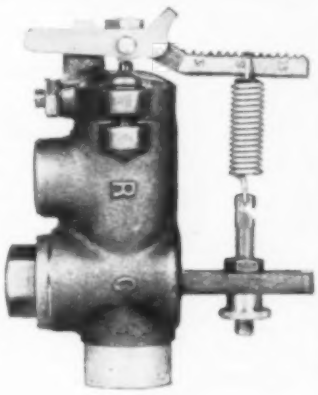

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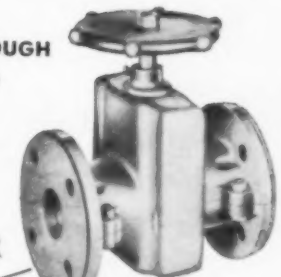

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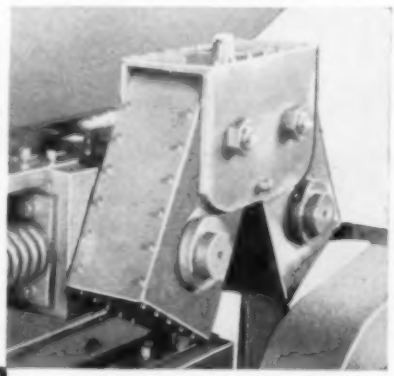

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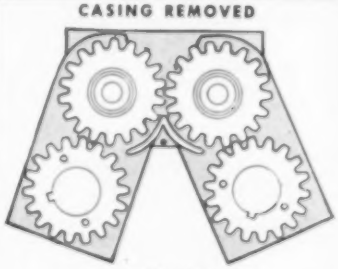

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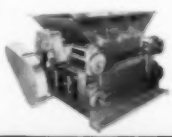

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along the belt so that touching them together will stop or start the motor. Three wires may be employed with magnetic reversing starters for moving the belt in either direction. "This setup is a convenient and very effective means for fire-bossing a mine in low coal."

"We of the Bureau of Mines are convinced that most belt fires or other mine fires are preventable."

Summarizing some of the work and findings in setting up tests and standards for fire-retardant belts (see pp 66-67 of this issue), S. P. Polack, health and safety engineer, U. S. Bureau of Mines, Pittsburgh, noted that even when all reasonable fire-prevention precautions have been taken it still is possible to have a conveyor-belt fire. Protection, therefore, remains an important consideration.

Preventive steps summarized by Mr. Polack were:

1. Fire-resistant conveyor belts properly installed.
2. Automatic slippage control. A new bureau publication on the "Safety Aspects of Controls and Operation of Belt Conveyors in Coal Mines" is scheduled for early distribution.
3. Proper electrical equipment properly installed.
4. Cleanliness.
5. Prevention of rubbing and friction.
6. A good communication system all along the conveyor system.
7. Regular inspection.

Protective steps suggested by Mr. Polack include:

1. Good fire-fighting facilities. A good guide is the bureau publication "Fire-Fighting Equipment in Coal Mines—Selection, Placement and Care."
2. An unobstructed travelway along conveyors with an alternate means of escape.
3. The right quantity and velocity of air—neither too much nor too little.

Haulage Automation

"There are many places where steps can be taken today toward the ultimate goal of complete automation."

The logical place to start considering automatic mine haulage is at the working place. Because of the moving face, however, this area presents one of the major problems, noted W. R. Morton, application engineer—mining, General Electric Co. Beyond the working section, the possible systems and applications include the following:

Conveyors with sequence control and protective devices for operation without attendance.

Conveyors to loading stations equipped for automatic mine-car loading.

Remotely controlled mainline locomotive operation through carrier frequency modified by audio tones. One problem is ability to "see." Television is the logical

answer but brings in some problems. However, these and others are not insurmountable.

Automatic rotary dumps.

Automatic shaft hoists.

Automatic bin loading in preparation plants. Automatic handling and loading of railroad cars.

Underground Power

"Every year, the importance of the power supply to the modern coal mine increases."

Reviewing trends in underground power, F. R. Sell, senior industrial power engineer, West Penn Power Co., Greensburg, Pa., noted that the fundamentals of a good system include:

Provisions for load growth.

Flexibility to meeting changing requirements.

Good voltage regulation.

Continuity.

Easy operation and maintenance.

Adequate investment for long-term benefits.

Safety.

Trends in DC include multiple feed to critical points, toward 500- and 750-kw rectifier sets, supervisory control for remote operation of circuit breakers, increased frequency of substation moves, and more circuit-breaker protection for underground circuits.

AC, Mr. Sell pointed out, has a number of inherent advantages, which accounts for growing interest in this form of power. Among them, from the manufacturing standpoint, are less space, an opportunity to use better insulation and lower cost. From the coal-operating standpoint, the advantages are:

1. Lower-cost power centers.
2. Higher efficiency in supplying operating vlotage.
3. Flexibility in moving because of reduced weight of power centers.
4. Greater safety because of superior grounding systems.

"Whether AC or DC, or some combination of both, will power the coal mine of the future will depend upon how well each can meet the fundamental requirements. It is safe to say, however, that distribution systems of the future will be required to serve mining machines with increased horsepower ratings and larger electrical load concentrations with greater flexibility and more reliability than ever before."

"Coal mining is one of the best examples of the fact that all labor-saving devices are either operated or controlled by electricity, or both."

Noting that mine mechanization has increased the electrical consumption per ton 50% in the past 10 yr, C. B. Peck Jr., manager, industrial sales, Anaconda Wire & Cable Co., noted that consumption at many mines in 1956 will be over 10 kwhr per tone. One problem is getting large quantities of power to the point of use—a trend highlighted by the fact that one mine is building a continuous miner with motors totaling 950 hp.

From the cable point of view, "it is obvious that higher voltage must be used not only at the face but in the transmission of the primary power supply. The economic limits of 5,000-V primary circuits and 275 DC or 220 AC at the face can easily be exceeded where large amounts of power are required at one place. In other words, a point is reached where it is less costly to use a higher-voltage cable rather than increase the size of the conductors."

Peabody Plans New Mines

Peabody Coal Co., Chicago, Ill., and W. G. Duncan Coal Co., Greenville, Ky., have formed the River Queen Coal Co. to strip mine in the Greenville-Central City area of Kentucky. Planned installations include a 1,000-tph washing and preparation plant and erection of a loading dock to ship coal on the Green River. A stripping shovel, with bucket capacity of 60 cu yd, is being built for the company. Production, estimated at 2 million tons annually, will be sold by Southern Coal Co., a Peabody subsidiary. Meanwhile, Midwest Coal Co., a subsidiary of Peabody, has announced the purchase of controlling interest in Midwest-Radiant Corp. and the Perry Coal Corp. Midwest-Radiant operates a strip mine and Perry an underground mine in Illinois.

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says W. V. Hartman, Supt. Victoria Coal Corp.

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Traction, hydraulic and electrical system operated by 109 hp engine. Push button controls. Drills can be operated singly or in tandem.

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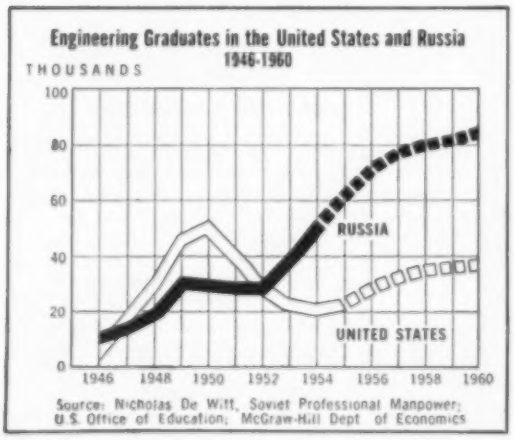
THE SHORTAGE OF SCIENTISTS AND ENGINEERS:

Are We Losing the Race with Russia?

THERE is new confidence in the Kremlin. One key reason is expressed in a recent boast of Communist Party Secretary Khrushchev: **"The capitalists always regard our people as being backward, but today we have more engineers and more supporting engineering technical personnel than any capitalist country."** He promised that this lead would be widened and that communism would be victorious without war.

This boast cannot be dismissed as communist propaganda. Admiral Lewis L. Strauss, chairman of the U. S. Atomic Energy Commission, has warned: **"In five years our lead in the training of scientists and engineers may be wiped out, and in ten years we could be hopelessly outstripped. Unless immediate steps are taken to correct it, a situation, already dangerous, within less than a decade could become disastrous."**

This second editorial in a series on the shortage of scientists and engineers is designed to explore as carefully as possible the facts and the implications of the new emphasis on technical training in the Soviet Union. It draws heavily from the authoritative book *Soviet Professional Manpower*, prepared for the National Academy of Sciences and the National Research Council by Nicholas DeWitt of the Russian Research Center of Harvard and released recently by the National Science Foundation.



Trend Is Against Us

If the Soviet Union already has a lead in technical manpower, it is not very great. Both the United States and Russia now have around a million scientists and engineers. About a third of the Russian engineers were trained on inferior pre-1935 standards. **It's the trend — shown in the chart — that is alarming.**

Over the last five years we have turned out only 142,000 engineers, compared to an estimated 216,000 in Russia. In 1955 our output was around 23,000 compared to their 63,000. Over the next five years our projected output is 153,000, against at least 400,000 in Russia. There will be an additional 150,000 or more in the satellites and Red China.

In Russia, 30% of the college students are in engineering, compared to 8% here. Another 30% or more take degrees in natural sciences. Moreover, unlike ourselves, the Russians are

ploughing back a large proportion of their science graduates into teaching, which implies a rapid buildup in the future.

Quality As Well As Quantity

It would be foolhardy to assume that these new Russian graduates are inferior to ours in the quality of their technical training. They start out with much more intensive mathematical and scientific preparation at the high school level. They study harder and longer in college, with more laboratory work and more practical training. Their courses and textbooks seem to be as thorough as ours. Even though the Russian graduates may be overspecialized, they get results.

These results have been striking. The Russians developed both A-bombs and H-bombs faster than we expected, and it's not certain that they had to rely much on espionage. They pushed ahead of us for a while in jet fighter design, and they showed up with a fleet of long-range bombers well ahead of schedule. They are crowding us on nuclear power, electronics and automation. There are grave fears that they have established a lead in the vital field of military rockets.

The goal of Soviet scientific manpower policy includes not only weapon supremacy but also leadership of the neutral and uncommitted areas of Asia, Africa and the Middle East. The Soviet leaders may be bluffing in their offers to export capital, but they are preparing to export Russian scientific and technical know-how in a big way.

How They Do It

The Russians are determined to win the race for scientific supremacy, and they do not count the cost. **They pay their scientists and engineers salaries that seem fantastic when compared with other Soviet incomes.**

Senior professors, research scientists and top engineers are a major segment of the Russian elite. Their incomes are frequently six to ten times the average industrial wage. (In the U. S. six to ten times the average industrial wage would be $25,000 to $40,000 a year.) Housing and other privileges are correspondingly lavish. While preaching equality, the Soviets use capitalistic incentives far more boldly than we do. Indeed, practicing engineers and scientists have been complaining about the exalted status of professors and top research people, and salary scales are now being adjusted to give greater emphasis to practical results.

The Russians are also generous in their aids to education. Tuition has just been made free at all levels. Undergraduates receive 200 to 500 rubles a month and graduate students 800 rubles (about equal to an industrial wage) to cover living expenses. The biggest stipends go to science and engineering students. College students are deferred from military service, and engineers and scientists often enjoy continued deferment even after graduation.

Finally, the Soviet leaders can channel engineers and scientists — and all other human and material resources — into any area they choose. And the areas the Soviet leaders choose are predominantly those that contribute to military or political objectives, rather than to a better life for consumers.

What's Our Answer?

We are certainly not going to adopt Soviet methods. We do not want scientific robots, but free men, able to understand and add to our democratic heritage. At the same time, our world leadership in technology — and perhaps even our survival as a nation — will be threatened if we allow ourselves to lag far behind Russia in the training of scientists and engineers. Ways to keep the United States in the race will be discussed in a later editorial in this series.

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(C) 2—8BU As Is or Rebuilt, 500V
(C) 2—8BU As Is or Rebuilt, 250V
(C) 3—8BU-11G, 220/440 Volt AC
(C) 2—32E7 Joy Shuttle Cars
(W) 4—32D Joy Battery Cars—complete
(C) 1—Lee Norse Shuttle Car
(W) 1—T2-5PG, 220/440 volt AC Cat Truck
(C) 1—Goodman 665 Cat Mounted Loader
(C) 1—Goodman 360 Track Mtd. Loader
(C) 1—1224 Goodman Cutter, Rubber Mounted
(W) 1—32E10 Shuttle Cars
(W) 2—5SC Joy Shuttle Cars

CONVEYORS

(W) 2—95A Goodman Belt Conveyors, 24" wide, approx. 1000' centers complete, less belt
(C&W) 8—61AM Jeffrey Room Conveyors
(W) 1—61HG Jeffrey Face Conveyor
(W) 4—G15 Goodman Shaker Conv.
(W) 4—G12½ Goodman Shaker Drives
(W) 1—PT12 Long Piggyback
(W) 4—15" Joy Chain Conveyors—Permissible
(C) 1—Joy Model C, 30", 750' Belt Line
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(C) 1—1224 Goodman Rubber Mtd.
(C) 1—824 Goodman, 42" t.g.
(W) 4—512 DA Goodmans
(C&W) 2—12AA Standard Goodmans
(C&W) 5—12AB Standard Goodmans, 35 H.P.
(W) 6—212AA Baby Goodmans
(C) 3—112 G3, 220/440 V. AC Goodmans
(W) 2—312, 220/440 V. AC Goodmans
(C) 2—712 Goodmans
(C&W) 20—35B & 35BB Jeffrey, As Is or Rebuilt
(C&W) 4—7AU Sullivans
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(W) 1—29U Jeffrey
(C) 1—29U, 220/440 Volt AC—Excellent

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(C) 2—MH110 Jeffrey, 42" t.g.
(W) 5—HM823 GE 42" t.g.
(W) 2—HM803 GE 42" t.g.
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(W) 1—HM803 GE 36" t.g.
(C&W) 3—3314T Goodmans, 6 ton, 42" t.g.
(W) 1—8-30 Goodman
(W) 1—8 Ton Goodman, 36" t.g.
(W) 1—12 Ton Goodman, 36" t.g.
(C) 1—Vulcan Diesel Locomotive—Rebuilt
(W) 85—44" t.g. End Dump Wood Mine Cars
(W) 75—ACF Drop Bottom, 48" t.g. Nearly New
(W) 80—44" t.g., End Dump Cars, All Steel

***(W) For further information please contact Whitesburg, Kentucky.**

(W) 50—36" t.g., ACF Drop Bottom
(W) 45—36" t.g. Sanford Day Drop Bottom
(W) 1—Battery Locomotive—42" t.g.—New

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(W) 1—5' Morrow Shaker Screen
(C) 1—42" Loading Boom
(C) 1—48" Loading Boom
(W) 1—18"x25' Belt Conveyor
(W) 1—18"x42' Belt Conveyor
(W) 1—18"x75' Belt Conveyor
(W) 1—34"x30' Belt Conveyor
(W) 6—Drag Conveyors of various sizes and lengths
(W) 3—Coal Crushers, 24x24, 30x36, & 24&30.

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(W) 1—300KW GE Rectifier
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(C&W) 12—Single Drum Hoists—10, 15, 20, 25, 35, 40, 50, 100 and 150 h.p.
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(W) 1—Set Fairbanks automatic track scales
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8—Goodman type 33, 6 ton, 44" and 48" Ga.
2—Goodman 8 ton, type 32A, 44" and 48" Ga.
3—Westinghouse type 902, 4 ton, 42" and 48" Ga.
2—Westinghouse type 904, 6 ton, 44" and 48" Ga.
2—Westinghouse type 906, 44" and 48" Ga.
2—Westinghouse, type 907, 10 ton, 44" and 48" Ga.
3—Gasoline and Diesel Locomotives, 4 to 10 tons.

TIPPLE EQUIPMENT

1—Cedar Rapids portable super Screening Plant.
1—Portable Belt Conveyor 20', gas driven.
1—Railroad Car Unloading Conveyor, gas driven.
1—Allis Chalmers 5' x 14' Ripple Vibrator.
1—4' x 10' Robbins Gyrex Vibrator.
1—4' x 14' Vibrator, three deck, low head.
Feeders, Drag Conveyors, and Loading Booms.

CUTTING MACHINES

3—Jeffrey 29UC Universal on cats.
4—Baby Goodman 212's, rebuilt.
3—Goodman 312's, 18" high.
3—Goodman 412's, 18" high.
3—Goodman 512's with Bugdusters, like new.
15—Goodman 12AA's and 112AA's.
10—Goodman 324 Slabbers.
2—Goodman 224 Slabbers.
2—Goodman 724 Slabbers.
30—Jeffrey 35L's, like new, 17" high.
15—Jeffrey 35B's, and 35BB's.
2—Jeffrey 29B's on track.
1—Jeffrey 29L, track mounted.
2—Jeffrey 29C's, track mounted.
1—Jeffrey 29U, Universal, track mounted.
1—Sullivan CR-10, 15" high.

LOADING MACHINES

7—Joy Loaders, all types.
2—Jeffrey 61 CLR's on rubber, 26".
3—Jeffrey L-500 Loaders.
2—Goodman 360 Loaders.
4—Myers Whaley No. 3 Automat Loaders.
4—Clarkson Loaders, 29" above rail.

CONVEYORS

4—Joy 30" Belt Conveyors, 10 to 40 H. P.
2—Goodman 97-C's, 28".
15000' 30" Conveyor Belt.
8—Jeffrey 61AM Room Conveyors, 300 ft.
10—Jeffrey 61HG Face Conveyors.
5—Room Conveyors, type 400, 300 ft.
2—61EW Elevating Conveyors.
2—61WH, 15" Room Conveyors, 300 ft.
4—Joy Ladel UN-17 Shakers.
10—Goodman G-12½ and G-15 Shakers.

CONVERTERS and DIESEL PLANTS

3—100KW, G. E. TCC-6's, 275 volt Rotary Converters.
3—150KW, G. E. HCC-6's, 275 volt Rotary Converters.
1—200KW, G. E. HCC-6 Rotary Converter, 275 DC.
3—300KW, G. E. HCC-6 Rotary Converters, 275 DC.
1—200KW Westinghouse Rotary Converter, 275 DC.
1—300KW Westinghouse Rotary Converter, 275 DC.
1—500KW Westinghouse Rotary Converter, 275 DC.
(All the above with 6900/13000 and-or 2300/4000 primary transformers).
2—150KW MG Sets, G. E. and Westinghouse.
2—200KW MG Sets, Westinghouse.
1—200KW MG Sets, General Electric.
2—300KW MG Sets, General Electric.
2—500KW MG Sets, General Electric.
1—Cummins 125KW, 250 volt DC.
1—700 H. P. Shaft Hoist, complete.
Complete steam plant, will sell all or any part.
Boilers, like new, 1100 H. P., 300 H. P. Transformers, Turbines, etc.
Complete Tipples with Cleaning Plants.

MISCELLANEOUS

10—Air Compressors, 1 H. P. to 40 H. P.
40 Mine Pumps, all types.
Pipe, Plastic, steel transit, all sizes 1" to 6".
35—Mine Cars, drop bottom, 42" Ga.
150 Mine Cars, 18" high, end dump, 44" Ga.
300 Mine Cars, end dump, 20" high, 48" gauge.
15—Brown Gayro HKL and HGD Car Spotters.
1—12 ton Differential Slate Larry.
4—Overhead Bridge Cranes.
1—Kanawha Hillside Dump.
5—Low Vein Water Cars.
Inclined Hoists, 25 to 50 H. P.
Machine Tools for Mine Shops.
1,000 Tons Rails, all sizes.
2,000 ft. 3/c, 5000 volt, 2/c Cable.
10 tons copper Trolley and Feeder.
300 Transformers from 1 to 2,000 KVA, 110 to 13,000 Primary Volts.
400 Electric Motors, 3 to 200 H. P.
Suspension Bridge, 300' long for river crossings.
1—International TD-24 Angledozer.
1—International TD-18 Angledozer.
Huge stock of mine supplies.

Thousands of other Items—Send Us Your Inquiries—It Doesn't Cost—It Pays to Buy From

Logan, West Virginia **J. T. FISH & COMPANY** **Phone 2825**

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TRACTORS — TRUCKS

190-B Bucyrus Erie Elec. 8 yd. Shovel
170-B Bucyrus Erie Elec. 6½ yd. Shovel
120-B Bucyrus Erie Elec. 5 yd. Shovel
1600 P&H 6 yd. Electric Shovel
2400 Lima 6 yd. Diesel Shovel
111-Marion 3½ yd. Diesel Shovel
955 P&H 2½ yd. Diesel Shovel
54-B Bucyrus Erie 2½ yd. Diesel Shovel
80-D Northwest 2½ yd. Diesel Shovel
22-B Bucyrus Erie ¾ yd. Shovel
7400 Marion Elec. Drag 200' boom, 8 yd.
625 Page Diesel Drag 160' boom, 9½ yd.
2400 Lima Diesel Dragline 130', 5 yd.
4500 Manitowoc Diesel Drag 120', 5 yd.
1055 P&H Diesel Dragline 80', 4 yd.
3500 Manitowoc Diesel Drag, 85', 2½ yd.
595 Link Belt, 75', 2½ yd., independent boom hoist
600 Reich Heavy Truck Mounted Rotary Drill
Quarrymaster Drill with 2-500 cu. ft. compressors
58-BH Joy Champion Rotary Air Drill
Also 42-T, 29-T & 27-T Well Drills

EUCLID TRUCKS—Many to Choose From

FRANK SWABB EQUIPMENT CO., Inc.
313 Hazleton Nat'l. Bank Bldg.
Hazleton, Pa. GLadstone 5-3658

BOX CAR LOADERS

3—Ottumwa 20 HP box car loaders
2—Manierre 22 HP box car loaders
1—Jeffrey 20 HP box car loader
2—Red Devil portable loaders, 12" x 15"
1—Card portable loader, 11' x 19"

ROTARY DUMPER

1—Card Rotary car dumper, 13' x 15' platform

ELECTRIC HOISTS

1—11 HP Vulcan, single drum
1—20 HP Vulcan, single drum
1—22 HP Vulcan, double drum
1—25 HP Vulcan, single drum
1—30 HP Vulcan, single drum
1—37 HP single drum
5—50 HP single drum
2—60 HP single drum
1—75 HP Vulcan Double Drum
4—100 HP Box single drum
1—112 HP Vulcan, single drum
1—150 HP Vulcan, single drum
2—125-200 HP Ottumwa single drum
1—250 HP Ottumwa single drum

RAIL

12—90# Rail, new and used, in stock, with fittings

LOADERS & CONVEYORS

3—5 BU Joy loaders, 250 V. D.C.
1—61EW Jeffrey elevating chain conveyor
1—61HG Jeffrey chain conveyor, 90'
1—61W Jeffrey chain conveyor, 200'
9—G-20 Goodman shakers
6—G-15 Goodman shakers
8—Vulcan shakers
1—UN-17 Joy LaDel shaker
10—Goodman HA durkbills

MINING MACHINES

A.C.

1—7B Sullivan super shortwall
10—Sullivan CE7
1—28A Jeffrey
5—112A Goodman

D.C.

3—7B Sullivan super shortwall
2—T-1 Joy crawler type trucks

SCALES

3—100 ton Fairbanks railroad scales
1—125 ton Howe railroad scales

COAL CARS

89—60 cu. ft. Card steel, end dump, 36" ga.
89—66 cu. ft. Card steel, end dump, 36" ga.

SHUTTLE CARS

1—Joy model 42DS, battery operated
1—Joy model 60D3P, battery operated
7—Joy model 60D1, battery operated

MINE FANS

1—120" Joy La-Del axial flow fan, model L-14
1—8H Jeffrey 42" aerodyne fan
1—7' Jeffrey aerodyne 2 stage fan

BATTERY LOCOMOTIVES

1—4 ton Westinghouse, 24" ga.
1—4 ton Ironton, 36" ga.
2—5 ton General Electric, 36" ga.
2—7 ton General Electric, 36" ga.
3—8 ton Ironton, 36" ga.
2—8 ton General Electric, 36" ga.
2—8 ton Goodman, 36" ga.
1—10 ton Atlas, 36" ga.

TROLLEY LOCOMOTIVES

1—2½ T. Jeffrey, 36" ga.
1—4½ T. Goodman, 36" ga.
1—5 T. Jeffrey, 36" ga.
1—6 T. Goodman, 36" ga.
1—6 T. Goodman, 42" ga.
2—6 T. Goodman, 42" ga.
3—10 T. Jeffrey, 42" ga.
1—13 T. Goodman, 42" ga.
1—13 T. Jeffrey, 42" ga.
3—15 T. Jeffrey, 42" ga.

MOTOR GENERATOR SETS

1—7 k.w. General Electric 125 V. DC — 440 V. AC
1—60 k.w. Imperial 250 V. DC — 440 V. AC
1—75 k.w. Lidgeway 125 V. DC — 2300 V. AC

COAL CRUSHERS

1—18" x 18" Jeffrey Single Roll
1—36" x 36" Jeffrey Single Roll

ROCK DUSTERS

1—M.S.A. type A, 2 HP 250 V. DC motor
1—M.S.A. type A, 440 V. AC motor
1—M.S.A. 2S-1103, 20 HP 230 V. DC motor

We have been authorized by the United States Bureau of Mines to repair and rebuild permissible equipment and to replace and affix permissible plates within existing requirements.

Since 1898 Dependable Reconditioned Machinery

Send for new reconditioned stock list catalogue 561-C.

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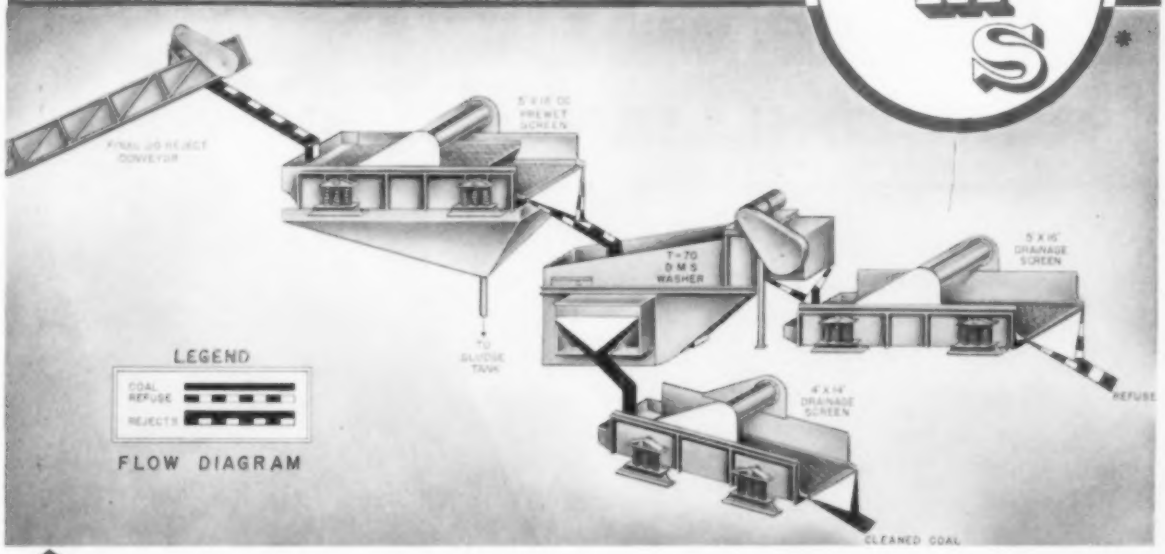
COAL PREPARATION NEWS

Performance At Elk River with . . .

DMS*

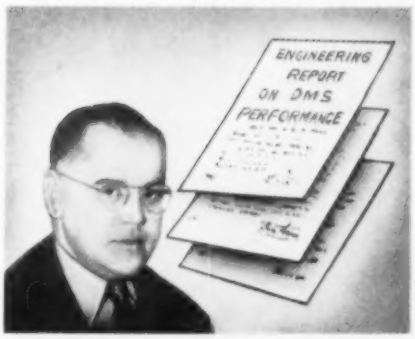


DMS Washer Salvages 12.5% More Coal

An Additional Profit of $2856.00 every day. That's what this DMS Preparation System means at the Widen, W.Va. mine of The Elk River Coal & Lumber Co. where it is installed to salvage coal from the rejects of two other washers. Faced with increasing reject losses in direct ratio to production increases, Elk River officials selected DMS as the only system that could handle big tonnages and still operate with better than 99% efficiency.

510 Tons More Of Premium Coal Per Day

Same underground production—510 tons more shipped every day from Widen, W.Va. It's top quality, Lower Kittanning coal. "Black Magic"? No—just another day's production for DMS.



Mr. Beattie Reports

Amazing Success To American Mining Congress

Reporting on "Salvage Of Coal From Washery Rejects," Mr. H. L. Beattie, V.P. of The Elk River Coal & Lumber Co. said about DMS performance at Widen: "Recovery of 413.3 tons of good coal per day had to be accomplished with a unit which would operate at high efficiency under difficult feed. A DMS Washer was the answer. Production has been boosted from 3500 to 5600 tons per day. Production per man jumped from 5.6 to 8.2 tons." Copies of Mr. Beattie's Convention Paper are available upon request.

Write Today For A Complete Copy Of Mr. Beattie's Report To The American Mining Congress On "Salvage Of Coal From Washery Rejects"

THE DANIELS COMPANY

22 North Fifth Street

Indiana, Penna

BRANCHES:

Newark, N. J. • Bluefield, W. Va.

DMS

* REG. U.S. PAT. OFFICE NO. 623396

FIRST REPORT

ON THE NEW D9

FROM BRILLIANT, OHIO

That big load on the blade tells a lot of the story. The CAT® D9 Tractor with No. 9S Bulldozer can handle up to 12 yds. per pass, and can travel at speeds up to 7.8 MPH. This D9 is stripping overburden from a seam of No. 8 coal for Tri-State Coal Co., five miles west of Brilliant, Ohio. Depth of overburden varies from 35 to 72 ft. The big yellow "King of the Crawlers" was only two months old when the picture was taken, and had been used on leveling spoil banks and other reclamation jobs, so accurate production figures were not yet available.

But there's no doubt that the new Cat D9 Tractor's performance will be outstanding. Owners report that it outworks previous big rigs by as much as two to one! Its completely new four-cycle diesel engine delivers 286 HP. The new Turbocharger, driven by engine exhaust, packs in air according to *load*, not RPM, for more working horsepower at all tractor speeds.

The D9 is tough and traditionally Caterpillar from its one-piece frame and steering clutch case assembly to track shoes hardened by a new "water quench" process. It's the product of many thousands of hours' testing on proving grounds and actual jobs in construction, mining and quarrying. And it's already a favorite with operators, thanks to hydraulically boosted steering and brakes, "in-seat" starting, and smooth "live shaft" drive for cable controls.

According to a Tri-State official, the firm bought its new D9 because of past performance of its Caterpillar equipment. "We've used Caterpillar products for a number of years with great success," he says. "Our local Caterpillar Dealer's co-operation was an important factor in our buying the D9." Why not get all the facts on this "workingest" tractor of them all from your Caterpillar Dealer? Call him today—and count on him for reliable service and Caterpillar parts you can trust.

Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

CATERPILLAR*

*Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.

NAME THE DATE... YOUR DEALER WILL DEMONSTRATE

For heavy hauling you'll do better with **JEFFREY** 8-wheel Trolley Locomotives

Big coal loads can be hauled fast with Jeffrey 27, 37 or 50-ton single-unit locomotives.

Operation and maintenance are better, too. The four-wheel, equalized double trucks and the short overhang at the ends give an easy ride at high speed. The eight wheels distribute the locomotive's weight for less concentrated rail loading.

Outstanding operating and safety features include: roller-bearing type journal boxes and motor axle suspensions . . . air and dynamic service brakes . . . automatic couplers with air-operated uncoupling . . . trolley with air-operated retriever . . . separate blower for each motor.

Other features of 8-wheel locomotives and other types for mainline and secondary haulage are described in Catalog 836. For a copy, write to The Jeffrey Manufacturing Company, Columbus 16, Ohio.

JEFFREY

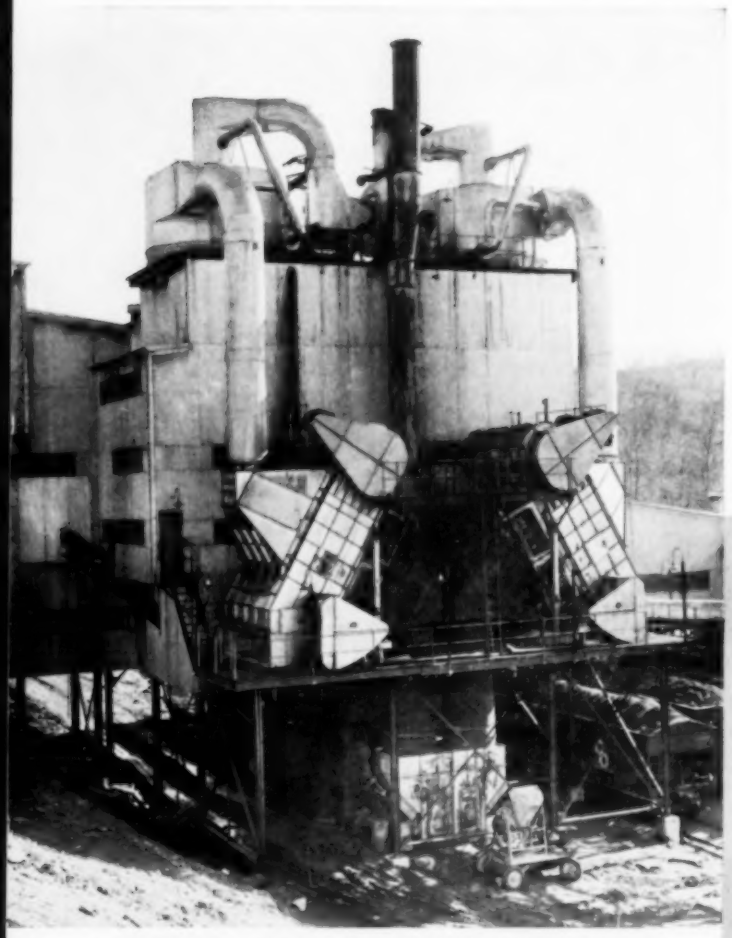
MINING • CONVEYING • PROCESSING EQUIPMENT
TRANSMISSION MACHINERY • CONTRACT MANUFACTURING

Coal operators order and re-order LINK-BELT Multi-Louvre Dryers

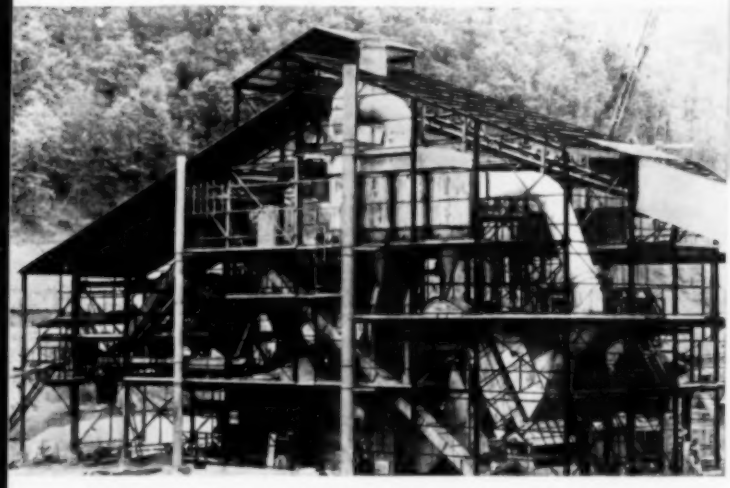
Yes, they're No. 1 choice for fast, safe, low-cost drying of 1½- to 0-inch coal

OF more than 40 Link-Belt Multi-Louvre Dryers now operating in preparation plants, the majority are repeat orders. And there's good reason for this continuing popularity. Special design minimizes air pressure drop . . . cuts power consumption and cost—*often as much as 50%*. And low air velocity reduces degradation and dusting . . . makes dust collection easy.

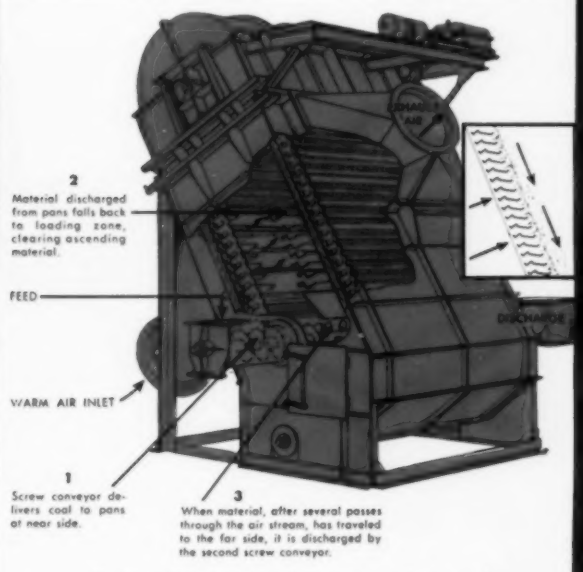
Just as important are the Multi-Louvre Dryer's accurate automatic controls that vary the feed rate and maintain low air intake temperatures, thus preventing oxidation . . . insuring uniform moisture reduction. For more complete information on how the Link-Belt Multi-Louvre Dryer can help you produce a better, more marketable product, call your nearby Link-Belt office. Or write for Book 2466.



Lower maintenance costs result from the simple design of these two Link-Belt Multi-Louvre Dryers at a West Virginia mine.



Lower temperatures possible with Multi-Louvre Dryers like this one at a Kentucky mine assure adequate moisture reduction.


2
Material discharged from pans falls back to loading zone, clearing ascending material.
FEED
WARM AIR INLET
1
Screw conveyor delivers coal to pans at near side.
3
When material, after several passes through the air stream, has traveled to the far side, it is discharged by the second screw conveyor.

Maximum heat transfer—Louvre pan action spreads coal in thin layers . . . directs air currents through moving curtain of material for highest operating efficiency.

LINK-BELT

13,011

MULTI-LOUVRE DRYERS

LINK-BELT COMPANY: Chicago 9, Birmingham 3, Cleveland 15, Denver 2, Detroit 4, Huntington 9, W. Va., Indianapolis 6, Kansas City 8, Mo., Louisville 2, Pittsburgh 13, Seattle 4, St. Louis 1, Scarboro (Toronto 13), Springs (South Africa).